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FINAL SUPPLEMENTAL REMEDIAL INVESTIGATION SITE 16 OPERABLE UNIT 1 (OU1)
MCAS CHERRY POINT NC
2/1/2012
CH2M HILL

Final

Supplemental Remedial Investigation Site 16, Operable Unit 1

**Marine Corps Air Station
Cherry Point, North Carolina**



Prepared for
Department of the Navy
Naval Facilities Engineering Command
Mid-Atlantic

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CH2MHILL

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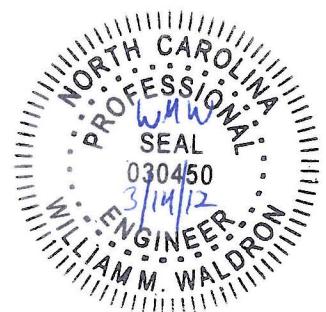
Under the

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Acronyms and Abbreviations

| | |
|----------------|---|
| AOC | area of concern |
| AS | air sparge |
| BERA | Baseline Ecological Risk Assessment |
| bgs | below ground surface |
| BHC | |
| BTV | background threshold value |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CLEAN | Comprehensive Long-term Environmental Action—Navy |
| COPC | constituent of potential concern |
| CSM | conceptual site model |
| DDE | dichlorodiphenyldichloroethene |
| DPT | direct push technology |
| EAD | Environmental Affairs Department |
| ELCR | excess lifetime cancer risk |
| FFA | Federal Facilities Agreement |
| FS | Feasibility Study |
| ft/day | feet per day |
| HHRA | Human Health Risk Assessment |
| HI | hazard index |
| IAS | Initial Assessment Study |
| IR | Installation Restoration |
| µg/kg | micrograms per kilogram |
| µg/L | micrograms per liter |
| mg/kg | milligrams per kilogram |
| MCAS | Marine Corps Air Station |
| MCB CamLej | Marine Corps Base Camp Lejeune |
| NACIP | Navy Assessment and Control of Installation Pollutants |
| NAVFAC | Naval Facilities Engineering Command |
| NC2B Standards | North Carolina Surface Water Quality Standards |
| NCGWQS | North Carolina Administrative Code, Title 15A, Subchapter 2L, Groundwater Standards |
| NCDENR | North Carolina Department of Environment and Natural Resources |
| NC SSL | North Carolina Soil Screening Level |
| OU | operable unit |
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| PRG | preliminary remediation goal |
| RCRA | Resource Conservation and Recovery Act |
| RFA | RCRA Facility Assessment |
| RFI | RCRA Facility Investigation |
| RI | Remedial Investigation |
| RSL | Regional Screening Level |

| | |
|----------|---|
| SARA | Superfund Amendments and Reauthorization Act |
| SRI | Supplemental Remedial Investigation |
| SVE | soil vapor extraction |
| SVOC | semivolatile organic compound |
| SW AOECS | Southwest Area of Ecological Concern |
| SWMU | solid waste management unit |
| TCRA | Time-Critical Removal Action |
| TPH | total petroleum hydrocarbon |
| USEPA | United States Environmental Protection Agency |
| VOC | volatile organic compound |

SECTION 1

Introduction

This Supplemental Remedial Investigation (SRI) Report presents the data and findings from environmental investigation activities conducted to further characterize the nature and extent of contamination and to assess potential risks to human health at Site 16, located within Operable Unit (OU) 1 at Marine Corps Air Station (MCAS) Cherry Point, North Carolina (**Figures 1-1 and 1-2**). Site 16 is a former borrow pit area that was subsequently used as a dump site located in southwestern OU1 (**Figure 1-3**).

This report was prepared under the Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Atlantic Division, Comprehensive Long-term Environmental Action—Navy (CLEAN) III Contract N62470-02-D-3052, Contract Task Order 0208, for submittal to NAVFAC Mid-Atlantic Division, MCAS Cherry Point Environmental Affairs Department (EAD), United States Environmental Protection Agency (USEPA) Region 4, and North Carolina Department of Environment and Natural Resources (NCDENR). The Navy, EAD, USEPA, and NCDENR work jointly as the MCAS Cherry Point Tier I Partnering Team.

Results of the historical site investigations performed at OU1 (including Site 16) from 1983 to 2000 were presented in the *Final Remedial Investigation for Operable Unit 1 (OU1)* (TetraTech, 2002), hereinafter referred to as the 2002 OU1 Remedial Investigation (RI). At Site 16, soil was found to be impacted with pesticides and polycyclic aromatic hydrocarbons (PAHs). However, the extent of contamination at Site 16 was not fully defined, and the soil data evaluated for potential risks to human health were grouped with soil data from other sites.

An updated Human Health Risk Assessment (HHRA) of all of the soil data collected only from Site 16 was conducted to evaluate the potential risks to human health. Results of the updated HHRA are included in this SRI and were summarized in the technical memorandum entitled *Summary of the Updated Human Health Risk Assessment—OU1 Site 16, Marine Corps Air Station Cherry Point, North Carolina* (CH2M HILL, 2011b), included as **Appendix A**.

1.1 Objectives and Approach

The overall objective of this SRI is to provide an updated evaluation of the nature and extent of soil contamination, assess the leachability of contamination from soil to groundwater, and evaluate potential risks to human health from exposure to soil at Site 16. This SRI combines the compendium of investigation reports related to Site 16 into one document and the evaluation is intended to support development of risk-based cleanup decisions, if warranted.

The specific objectives and approach of the SRI are as follows:

- Review and incorporate relevant results from historical and recent investigations at Site 16:
 - 2002 OU1 RI (TetraTech, 2002)
 - Baseline Ecological Risk Assessment (BERA) (CH2M HILL, 2005)
 - 2009 OU1 Additional Investigation (CH2M HILL, 2009a)
 - OU1 RI Addendum (CH2M HILL, 2009b)
- Quantitatively assess potential human health risks associated with exposure to constituents detected in site soil (CH2M HILL, 2011b)

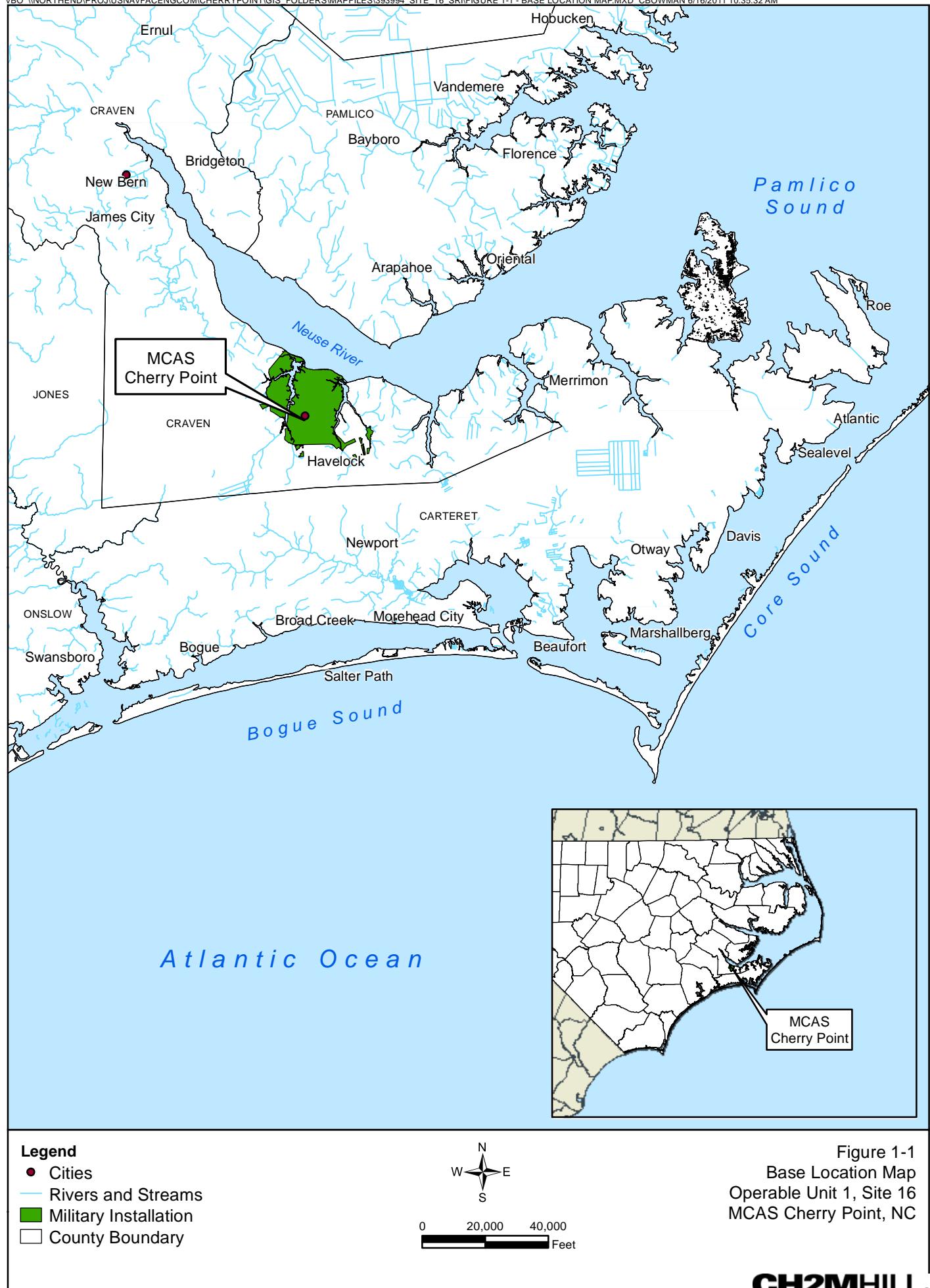
1.2 Report Organization

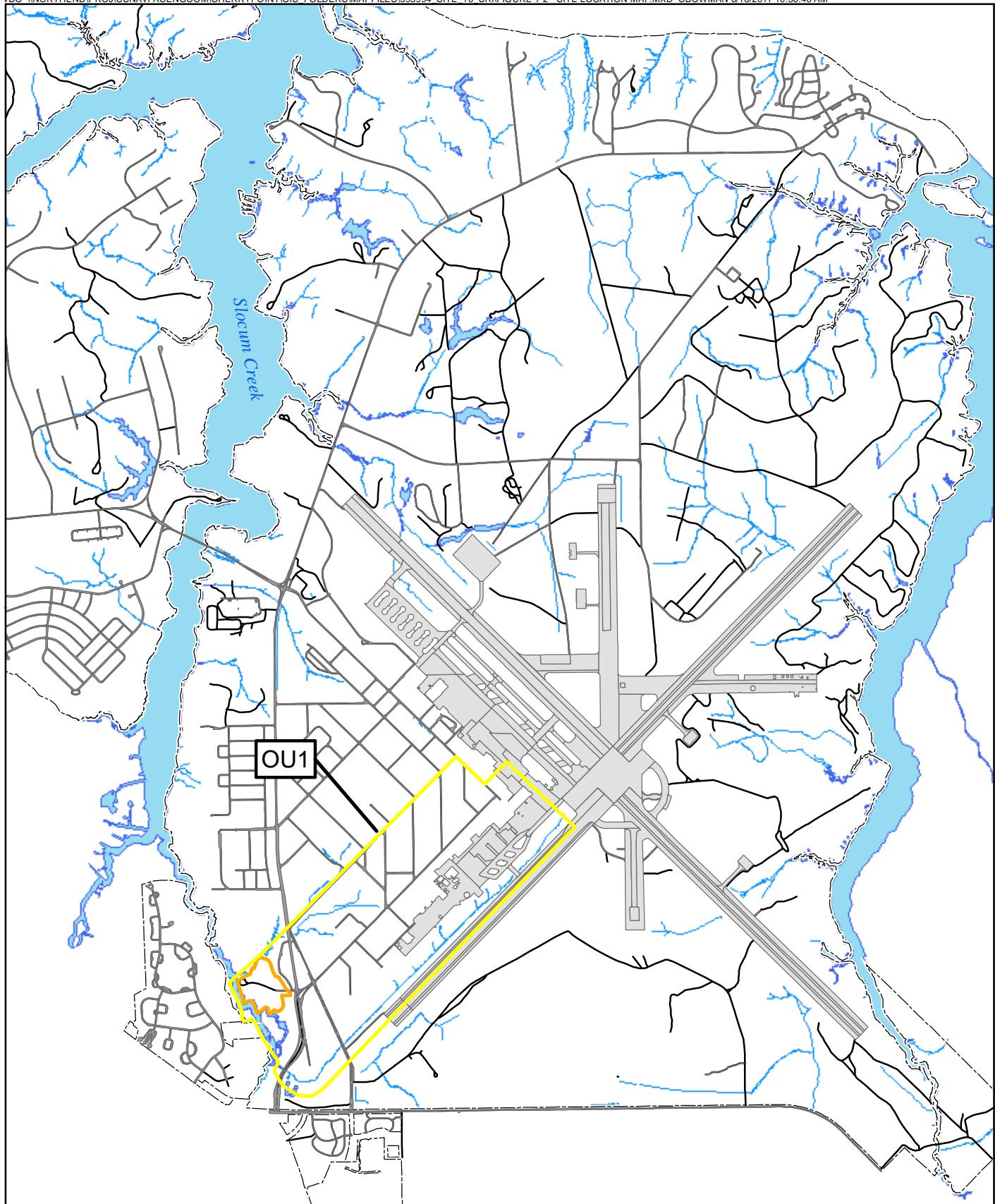
This SRI is composed of the following sections:

- **Section 1**—Introduction
- **Section 2**—Site Background and History
- **Section 3**—Conceptual Site Model
- **Section 4**—Human Health Risk Assessment Summary

- **Section 5—Conclusions and Proposed Path Forward**
- **Section 6—References**

Tables and figures are provided at the end of each respective section. Appendices are provided electronically in PDF format on CD-ROM.





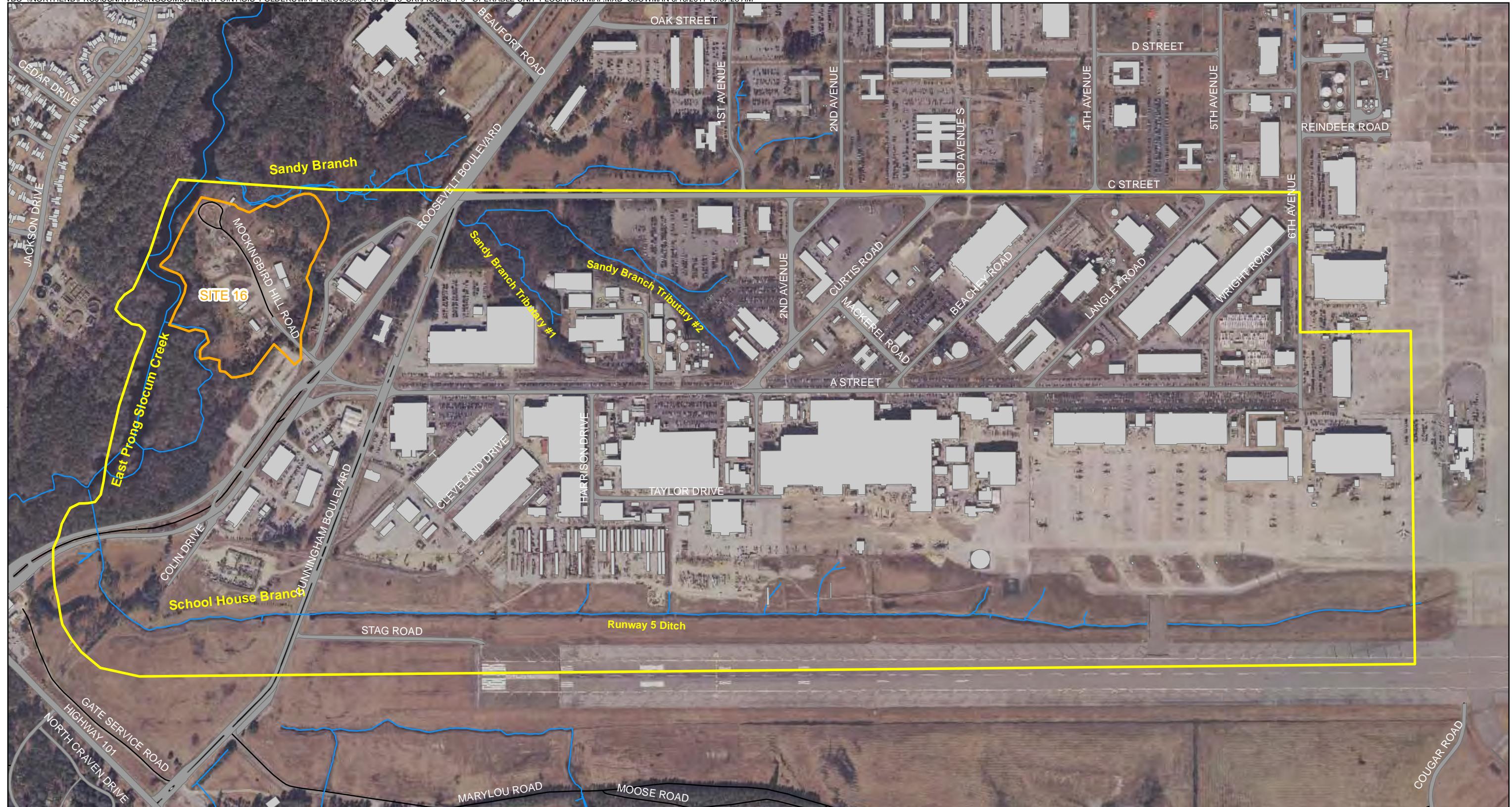
Legend

- OU Boundary
- Surface Water
- Site 16 Boundary
- Runway
- Road
- Base Boundary



0 1,500 3,000
Feet

Figure 1-2
OU1 - Site Location Map
Operable Unit 1, Site 16
MCAS Cherry Point, NC



Legend

- Surface Water
- Site 16 Boundary
- OU1 Boundary
- Existing Buildings

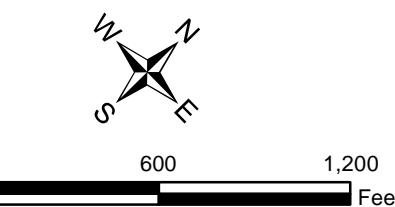


Figure 1-3
Site 16 Location Map
Operable Unit 1, Site 16
MCAS Cherry Point, NC

SECTION 2

Site Background and History

This section provides a general summary of both the MCAS Cherry Point Installation and Site 16, including site descriptions, environmental history, and previous investigations.

2.1 Installation Description

MCAS Cherry Point is a 13,164-acre military reservation located adjacent to the city of Havelock in southeastern Craven County, North Carolina (**Figure 1-1**). MCAS Cherry Point was commissioned in 1942 and provides support facilities and services for the Second Marine Aircraft Wing, the Fleet Readiness Center–East (formerly the Naval Aviation Depot), Combat Service Support Detachment 21 of the Second Marine Logistics Group, the Naval Air Maintenance Training Group Detachment, and the Defense Reutilization and Marketing Office. MCAS Cherry Point maintains facilities for training and for supporting the Atlantic Fleet Marine Force aviation units and is designated as a primary aviation supply point.

2.2 Environmental History

MCAS Cherry Point has been actively involved with environmental investigations and remediation programs since 1983, beginning with the Navy Assessment and Control of Installation Pollutants (NACIP) Program. The NACIP Program was modeled after the USEPA Superfund Program, authorized by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or “Superfund”) in 1980. An Initial Assessment Study was the first investigation of potentially hazardous sites at MCAS Cherry Point conducted under NACIP in 1983.

The Navy Installation Restoration (IR) Program was initiated in 1986, following enactment of the Superfund Amendments and Reauthorization Act (SARA), and replaced the NACIP. In 1988, a Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) was conducted at MCAS Cherry Point. The RFA was the first step under the RCRA corrective action process and consisted of a preliminary review of all available relevant documents, a visual site inspection, and a sampling event (when appropriate) at the 114 solid waste management units (SWMUs) and two areas of concern (AOCs) identified in the RFA.

In 1989, the Navy entered into a RCRA Administrative Order on Consent (Consent Order) with USEPA to perform RCRA Facility Investigations (RFIs) at 35 of the 114 SWMUs identified in the RFA. On December 16, 1994, MCAS Cherry Point was scored and ranked by USEPA for inclusion on the CERCLA National Priorities List. Since the Consent Order was signed, additional sites have been identified. The original RCRA permit modification was issued in 1998 and identified 116 new SWMUs and two new AOCs.

On May 12, 2005, the Navy, USEPA, and NCDENR executed a Federal Facilities Agreement (FFA) for MCAS Cherry Point. Under the FFA, all past and future work at IR Program sites, SWMUs, and AOCs will be reviewed, and a course of action for future work requirements at each site will be developed. The execution of the FFA effectively terminated the RCRA Consent Order.

As part of the requirements established under CERCLA, an administrative record file has been established for the IR Program at MCAS Cherry Point. The administrative record is a compilation of all documents that the Navy uses to select a remedial action or removal action for a site. Regardless of the nature of the site, an administrative record must be maintained. The administrative record will also serve as the basis for any future legal review of decisions made by the Navy concerning remedial action taken at a site. A copy of the MCAS Cherry Point administrative record file is available for review online as part of the MCAS Cherry Point IR Program public Website at: <http://go.usa.gov/2EH>.

2.3 Operable Unit 1 and Site 16

OU1 is an industrial area approximately 565 acres in size, located in the southwestern portion of MCAS Cherry Point (**Figures 1-2 and 1-3**). OU1 is bound by C Street and Sandy Branch to the northwest, portions of the MCAS Cherry Point flightline and runway to the northeast and southeast, and East Prong Slocum Creek to the southwest.

Twelve sites at OU1 were identified as requiring additional investigations. Only Site 16 is evaluated in this SRI Report. Sites 14, 15, 17, and 18 require no further action (CH2M HILL, 2010). Sites 42, 47, 51, 52, 83, 92, and 98 are currently being evaluated separately from Site 16. Sites 42, 47, 51, 52, 92, and 98 were identified as contributing to the OU1 Central Groundwater Plume, which migrates in the surficial aquifer through Site 16 (CH2M HILL, 2009b).

Site 16 (referred to as the Landfill at Sandy Branch) is approximately 19 acres in size and located along the western portion of OU1. The site is bounded to the north by Sandy Branch, to the west by East Prong Slocum Creek, to the south by a wetland area and an unnamed tributary to East Prong Slocum Creek, and to the east by a road off Roosevelt Boulevard (**Figure 1-3**). Site 16 is a former borrow pit area that was subsequently used as a dump site. The site is currently used for storage and solid waste handling (i.e., transfer) and to store bulk materials (e.g., rip rap, gravel, fill dirt, mulch). It is no longer used for solid waste recycling activities. There are also currently several buildings and an automobile impound lot located on the site.

The Initial Assessment Study (IAS) reports that between 1946 and 1948, up to 20,000 gallons of waste oil, one or more 55-gallon drums of potassium cyanide, and unspecified quantities of other wastes (municipal-type refuse) were reportedly disposed of at Site 16 (Water and Air Research, 1983). Aerial photographs are reported to indicate possible dumping after 1949. The OU1 RI Report determined through sampling and analysis whether specific constituents identified in the IAS, and other possible contaminants, existed at concentrations considered to be hazardous (TetraTech, 2002). Details of the environmental investigations conducted at Site 16 are included in **Section 2.4**.

2.4 Summary of Previous Investigations and Removal Action

The results of the environmental investigations and interim remedial actions conducted at Site 16 between 1983 and 2000 were summarized and presented in the 2002 OU1 RI (TetraTech, 2002). The two interim remedial actions included the installation of an Air Sparge (AS)/Soil Vapor Extraction (SVE) system and a removal action of debris piles and soil (**Figure 2-1**). Additional investigation activities related to ecological risk evaluation were conducted at Site 16 in 2004 as part of the OU1 BERA (CH2M HILL, 2005). The results of the subsequent investigations conducted to further characterize the chlorinated volatile organic compound (VOC) groundwater plume beneath OU1, which included sampling of soil and groundwater within Site 16, were presented in the OU1 RI Addendum (CH2M HILL, 2009b).

The following sections briefly summarize the various site investigations and remedial actions completed to date at Site 16 (from oldest to most recent). Groundwater, soil, surface water and sediment sampling locations from these investigations and remedial actions are shown in **Figure 2-1**. More detailed results of the environmental investigations are discussed in **Section 3.2**.

2.4.1 Remedial Investigation Interim Report

From 1984 to 1987, investigations were conducted at Site 16 and documented in the RI Interim Report (NUS Corporation, 1988). Nine monitoring wells were installed at the site and were sampled during three events. Concurrent with the groundwater investigation, surface water and sediment samples were collected from East Prong Slocum Creek and Sandy Branch. The results showed the presence of VOCs within groundwater and surface water at Site 16. Subsequent investigation activities would later conclude that the VOCs detected in groundwater and surface water at Site 16 did not originate onsite, but migrated from upgradient source areas within other OU1 sites (**Section 2.4.8**).

2.4.2 Resource Conservation and Recovery Act Facility Investigations

Multiple RFIs were conducted at Site 16 from 1990 to 1993 and documented in the following reports:

- *Draft Final RCRA Facility Investigation Report, Units 5, 10, 16, and 17 Marine Corps Air Station, Cherry Point, North Carolina* (Halliburton NUS, 1991)
- *Final Technical Direction Memorandum for Units 10 and 16, Marine Corps Air Station Cherry Point, North Carolina* (Halliburton NUS, 1992)

- *Final RCRA Facilities Investigation, 21 Units, Marine Corps Air Station Cherry Point, North Carolina* (Halliburton, 1993)

The investigations conducted at Site 16 included a soil-gas survey, collection of multiple soil samples, monitoring well installations, groundwater sampling, and surface water and sediment sampling. The results showed the presence of VOCs within groundwater. Subsequent investigation activities would conclude that the VOCs detected in groundwater at Site 16 did not originate onsite, but migrated from upgradient source areas within other OU1 sites (**Section 2.4.8**).

2.4.3 Site 16 Air Sparge/Soil Vapor Extraction System

As documented in the Basis of Design Report (B&R, 1997), a pilot-scale AS/SVE system was installed at Site 16 in November 1996 and operated until March 1997. Air injection, air extraction, and groundwater monitoring wells were installed and samples were collected and analyzed as part of a treatability study. Soil samples were collected and analyzed for geotechnical parameters. The data from the treatability study were used to design a full-scale Site 16 AS/SVE system.

The full-scale AS/SVE system was installed within the boundaries of Site 16 in 1998 to treat VOC-contaminated groundwater and limit VOC groundwater discharge to surface water. The objective of the system was to reduce VOC concentrations within the OU1 Central Groundwater Plume, which originates from several upgradient source areas within OU1 and migrates beneath Site 16 on its path toward discharging to Sandy Branch and East Prong Slocum Creek. **Figure 2-1** shows the locations of the AS/SVE system wells.

A dual line of air injection wells and vapor recovery wells were installed. Additional groundwater monitoring wells were installed to determine the effectiveness of the treatment system. Details of the full-scale system is described in the AS/SVE Remedial Action Report (OHM, 1999). The system was shut down in 2005 after a determination that it was not achieving the remedial action objectives. The system components were initially left in place in order to allow for possible later reuse. In 2008, an evaluation was performed to determine the condition of the system components and the actions necessary to restore the system to operation. The evaluation revealed that the system components had degraded such that reuse without substantial equipment replacement and rehabilitation would not be possible. The major system components were removed in 2009.

2.4.4 Debris Piles Removal Action

A CERCLA Time-Critical Removal Action (TCRA) was conducted at Site 16 in 1997 related to the six debris piles located in the southeastern portion of the site, adjacent to an unnamed tributary of Slocum Creek, along with tanks, empty storage vessels, and other construction debris that were documented during the RFI activities. Asbestos-containing material, debris, and soil contaminated with petroleum hydrocarbons, asbestos, and lead were removed for offsite disposal. All visible surface debris was removed. A total of approximately 2,091 tons of debris and contaminated soils were sent to designated facilities for disposal. Confirmation soil samples were collected to verify the condition of the area following removal of the stockpiled contaminated material. The details of this removal action are presented in the TCRA Report (OHM, 1998).

2.4.5 Remedial Investigation for Operable Unit 1

The objective of the 2002 OU1 RI (TetraTech, 2002) was to collect adequate chemical data across OU1 to determine the nature and extent of contamination and to determine whether the contamination presented an unacceptable risk to human health or the environment at OU1. Data from historical site investigations were used in conjunction with additional soil, sediment, groundwater, and surface water samples collected for the RI.

Potential unacceptable risks to human health from exposure to PAH and pesticide compounds in soil were identified at the area of Site 16 for the hypothetical future resident and construction workers, and additional evaluation of potential environmental risk was recommended for the area of Site 16, including Site 83 and Site 5. No risk was identified for other potential receptors to soil.

Risks associated with exposure to groundwater were evaluated OU1-wide for the surficial, Yorktown, and Castle-Hayne aquifers. Potential unacceptable risks were identified for potential future potable use of groundwater from the surficial aquifer, due to chlorinated VOCs, carcinogenic PAHs, arsenic, iron, and thallium. The carcinogenic

PAHs were mainly detected in one monitoring well upgradient of Site 16. Arsenic and iron were determined to be associated with background conditions and the occurrence of thallium was attributed to false-positive detections related to the laboratory analytical method. No risk was identified for the Yorktown and Castle Hayne aquifers (TetraTech, 2002).

Risks were also evaluated OU1-wide for surface water and sediment exposures. The estimated cancer risk for exposure to OU1 sediments by child residents and lifetime residents exceeded USEPA target levels. The risk was associated with PAHs observed in one sediment sample within Schoolhouse Branch, not adjacent to Site 16. All other receptors potentially exposed to sediment were below or within the USEPA target risk range of 10^{-4} and 10^{-6} and hazard indices (HIs) were below the acceptability threshold of 1.0. All receptors potentially exposed to surface water were below or within the USEPA target risk range of 10^{-4} and 10^{-6} and HIs were below the acceptability threshold of 1.0 (TetraTech, 2002).

2.4.6 Step 3a Addendum Screening-Level Ecological Risk Assessment

The Step 3a Addendum to the Screening-Level Ecological Risk Assessment (CH2M HILL, 2003) was prepared to further refine the receptor exposure scenarios, delineate more-specific contaminant sources, delineate the spatial extent of such contamination, and develop a better understanding of potential risks to ecological receptors at OU1. The report presented an evaluation of existing analytical data within Site 16, and a portion of Site 16 was identified as an area posing potential ecological risk that should receive further evaluation through a BERA.

2.4.7 Baseline Ecological Risk Assessment

As part of the OU1 BERA (CH2M HILL, 2005), additional soil samples and toxicity samples from small insects were collected from within Site 16 to fill data gaps and to address areas of uncertainty. The samples within Site 16 were evaluated in the OU1 BERA as a portion of "Soil Grouping 3" that was termed the "Southwest Area of Ecological Concern" (SW AOEC). The SW AOEC is an approximately 2-acre wooded peninsula within Site 16 located north of East Prong Slocum Creek and southwest of Building 1811. Based on the results of the Step 3a Addendum (CH2M HILL, 2003), metals (e.g., mercury, zinc) and polychlorinated biphenyls (PCBs) were identified as constituents of potential concern (COPCs) for the SW AOEC within Soil Grouping 3.

Eight surface soil samples (0 to 6 inches below ground surface [bgs]; SO-100 through SO-107) were collected within Site 16 (SW AOEC) and analyzed for semivolatile organic compounds (SVOCs), pesticides, PCBs, metals, and cyanide. In addition, each of the eight samples were subjected to 28-day toxicity tests utilizing small insects called *Collembolan* (common name: Springtail), which are ecologically important organisms within most terrestrial environments. Details of the investigation approach and conceptual site model (CSM) are presented in the OU1 BERA (CH2M HILL, 2005).

A total of 25 metals, as well as eight pesticides, 14 PAHs, and four SVOCs were detected in the eight SW AOEC soil samples from within Site 16. PCBs were not detected in any of the samples. The results of the toxicity testing showed that, compared to reference group survival and reproduction, the SW AOEC samples did not show significantly reduced survival or reproduction. The only observed toxicity correlation from the toxicity testing was with respect to grain size (medium and coarse sand), which is not related to site contamination, but is representative of physical stressors in the site samples. None of the detected chemical concentrations were correlated with adverse effects. The OU1 BERA concluded that there are no site-related risks for receptors within Site 16.

2.4.8 Operable Unit 1 Remedial Investigation Addendum

The objective of the OU1 RI Addendum (CH2M HILL, 2009b) was to present the data and findings obtained from additional investigation activities conducted to further characterize the nature and extent of VOC groundwater contamination across OU1. The OU1 RI Addendum provided updated information regarding groundwater conditions and the nature and extent of chlorinated VOC groundwater contamination, and assessed the potential risks posed by the contamination to human health and the environment.

The OU1 RI Addendum also included the results from an additional investigation conducted at Site 16 in the area of monitoring well 16GW04 to evaluate if Site 16 was a potential source of chlorinated VOCs in groundwater. The

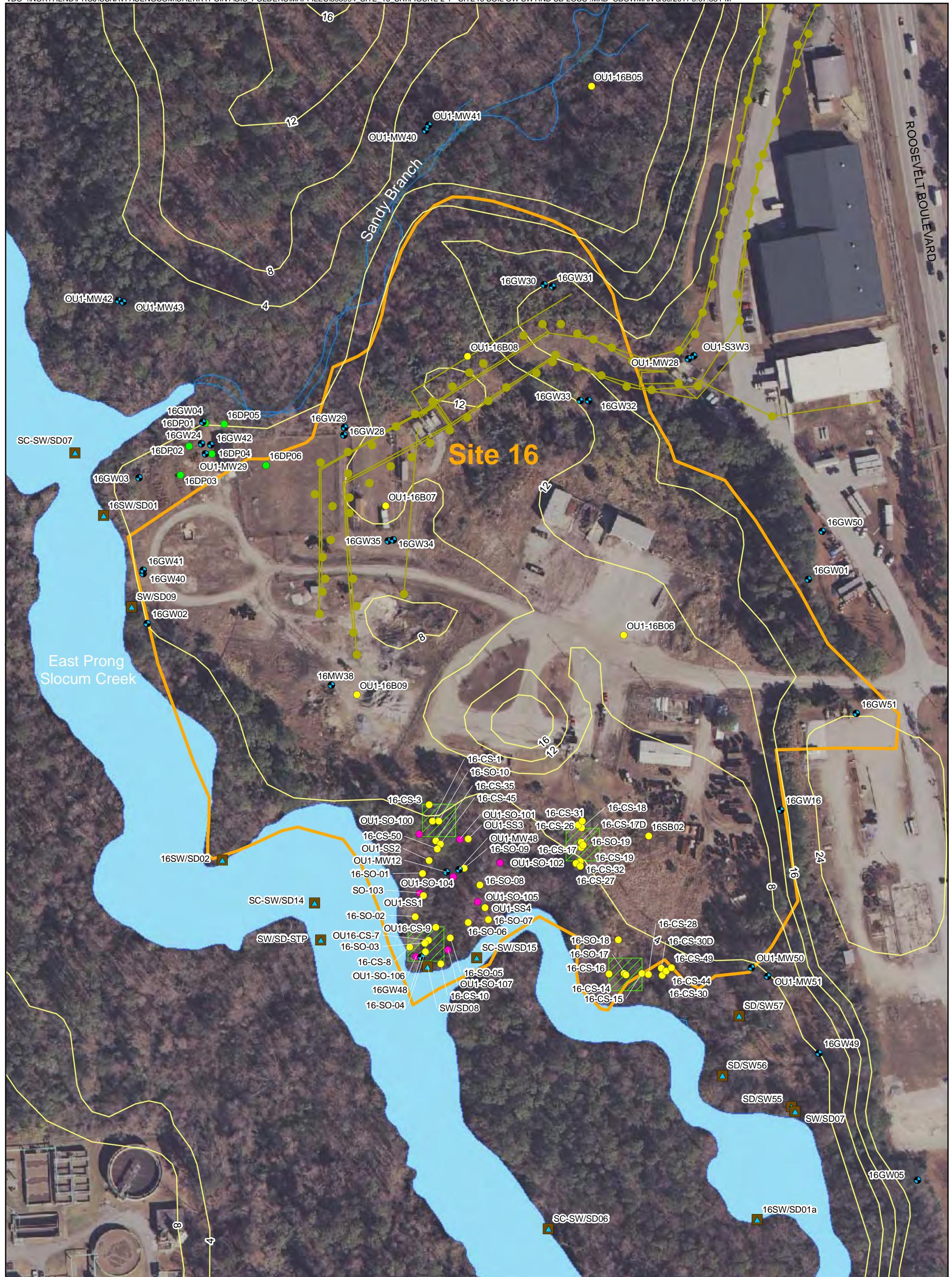
investigation included the collection of soil samples using direct-push technology (DPT) at six locations, (16DP01 through 16DP06), groundwater samples at five of the DPT soil sampling locations, and groundwater samples from three existing monitoring wells (16GW03, 16GW04, and 16GW05). The OU1 RI Addendum concluded that Site 16 is not the source of elevated chlorinated VOC concentrations within the surficial aquifer, and is a result of upgradient OU1 sources.

The chlorinated VOC groundwater contamination observed beneath Site 16 is being addressed separately as part of the OU1 Central Groundwater Plume Feasibility Study (FS).

2.4.9 Additional Groundwater Investigation

In 2009, additional field activities were conducted to further characterize the extent of the chlorinated VOC groundwater plume at OU1. The field activities included the collection of groundwater samples from 160 existing monitoring wells and the installation and sampling of 14 new monitoring wells.

In May 2010, one upper surficial aquifer monitoring well (16GW48) was installed and sampled by Rhea Engineers and Consultants (Rhea) within the Site 16 boundaries to serve as part of a monitoring well network for the OU1 Central Groundwater Plume long-term monitoring and also to assess the potential of soil contaminant leachability to groundwater at Site 16 (**Figure 2-1**). Laboratory data and a monitoring well installation diagram can be found in **Appendix B**.



Legend

- Monitoring Well
- Soil Sample Location (OU1 RI Addendum (CH2M HILL, 2008))
- Soil Sample Location (BERA (CH2M HILL, 2005))
- Soil Sample Location (OU1 RI (TetraTech, 2002))
- ▲ Surface Water/Sediment Location
- Surface Water
- Ground Surface Contour (4 feet interval)
- 1997 Excavated Area (Debris Piles Removal Action)



0 70 140 Feet

Figure 2-1
Sample Locations
Operable Unit 1, Site 16
MCAS Cherry Point, NC



Conceptual Site Model

This section provides a general summary of the CSM and assesses the nature and extent of contamination at Site 16. The 2002 OU1 RI (TetraTech, 2002) and the OU1 RI Addendum (CH2M HILL, 2009b) provide detailed information regarding the hydrogeologic conditions, nature and extent of contamination, chemical fate and transport, and human health and ecological risk at Site 16. A summary of each as it relates to Site 16 is presented below. A simplified CSM of Site 16 is shown graphically in **Figure 3-1**.

3.1 Physical Characteristics

This subsection presents an evaluation of the Site 16 physical characteristics pertaining to the surface features and conceptual hydrogeology of the site. The physical characteristics describe the primary mechanisms that control the fate and migration of contamination at the site.

3.1.1 Topography

Site 16 generally slopes west and southwest towards East Prong Slocum Creek (**Figure 2-1**). The majority of the soil samples were collected on a small peninsula in the southern portion of the site. This area exhibits little topographic relief. The relative flat topography and presence of organic cover are both advantageous in limiting contaminant migration from the site.

3.1.2 Surface Water

East Prong Slocum Creek is located to the west of Site 16, and Sandy Branch is located to the north. These creeks are brackish and eventually flow into the Neuse River. East Prong Slocum Creek and Sandy Branch have been classified by NCDENR as Class C fresh water bodies (freshwaters protected for secondary recreation, fishing, aquatic life, including propagation and survival, and wildlife).

3.1.3 Geology

In general, the uppermost soils consist predominantly of fill material composed of sand, silt, and clay mixed with wood fragments that may extend to a depth of 10 feet below ground surface (bgs). Within the majority of OU1, the native soils beneath the fill material (from shallowest to deepest) include:

- Holocene-age undifferentiated deposits and Pleistocene-age Flanner Beach Formation composed of unconsolidated, interfingered beds of fine-grained sand, silt, clay, shell, and peat beds, and scattered deposits of coarse-grained material to a depth of 40 to 50 feet bgs. A layer of coarse sand with abundant shell fragments commonly marks the base of the Flanner Beach Formation.
- Pleistocene-age James City Formation composed primarily of clay that is generally 10 feet thick.
- Pliocene-age Yorktown Formation composed of fine- to coarse-grained sand with clay that is generally 50 feet thick.
- Miocene-age Pungo River Formation composed of fine-grained sand that is approximately 80 feet thick.

However, beneath Site 16, a paleochannel has eroded into the Pungo River Formation, depositing younger-aged sediments composed of interfingered beds of fine-grained sand, silt, and clay, with deposits of coarse-grained sand.

3.1.4 Hydrogeology

The hydrogeologic framework beneath OU1 consists of nine hydrostratigraphic units: five aquifers and four confining units that extend to a depth of approximately 500 feet. From shallowest to deepest, the aquifers with associated confining units include the surficial, Yorktown, Pungo River, Upper Castle Hayne, and Lower Castle Hayne aquifers. Each aquifer is separated by a confining unit except where these units are absent or discontinuous.

Beneath the area encompassing Site 16, the paleochannel has eroded the Yorktown and Pungo River confining units and deposited younger-aged sediments. As a result, the uppermost aquifers are likely in direct hydraulic communication.

The depth to the groundwater table (i.e., thickness of the vadose zone) beneath Site 16 is generally 5 feet bgs. Groundwater flows generally westward towards East Prong Slocum Creek and Sandy Branch at an average groundwater velocity of 0.1 to 0.2 feet per day (ft/day). An upward vertical hydraulic gradient occurs beneath the site (CH2M HILL, 2009b).

3.2 Nature and Extent of Contamination

This subsection presents an updated evaluation of the nature and extent of contamination at Site 16. The nature and extent of contamination provides fundamental information to the evaluation of contaminant fate and transport and potential risks.

3.2.1 Data Evaluation

The historical sampling activities at Site 16 used to evaluate the nature and extent of contamination included soil, groundwater, sediment, and surface water sampling as part of the 2002 OU1 RI (TetraTech, 2002), soil sampling as part of the OU1 BERA (CH2M HILL, 2005), soil and groundwater sampling as part of the OU1 RI Addendum (CH2M HILL, 2009b), and groundwater sampling as part of the 2009 additional investigation activities.

3.2.2 Soil

Site-specific soil investigations were conducted at Site 16 during the 2002 OU1 RI (TetraTech, 2002) and the OU1 BERA (CH2M HILL, 2005) to evaluate the nature and extent of contamination and the effectiveness of the previous debris and soil removal activities. Previous environmental investigations compared soil results to USEPA Region 9 residential and industrial soil Preliminary Remediation Goals (PRGs), North Carolina Soil Screening Levels (NC SSLs) for the protection of groundwater, USEPA Region 4 ecological soil screening values, and two times average background concentrations established in the MCAS Cherry Point background evaluation report (Tetra Tech, 1999) for preliminary data screening. For this SRI, soil data have been compared to the most recent screening criteria, including the USEPA Regional Screening Levels (RSLs) (USEPA, 2010a), and the North Carolina Soil Screening Levels (NC SSLs). The RSLs for non-carcinogenic compounds were adjusted by dividing by 10 to conservatively account for exposure to multiple analytes.

The distribution of soil contamination at Site 16 is shown in **Figure 3-2** through **Figure 3-5**. Soil samples were historically collected throughout Site 16; however, more recent investigations focused in the southern portion of the site in the area of the former debris piles, which represents the area with the highest potential for contamination at the site

Table 3-1 summarizes the COPCs in soil observed above screening criteria and the maximum concentrations detected at Site 16. COPCs included VOCs, SVOCs, pesticides, PCBs, and metals and are listed below:

- **VOCs**—vinyl chloride, benzene, and methylene chloride
- **SVOCs**—benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene
- **Pesticides**—alpha-BHC, dieldrin, and heptachlor epoxide
- **PCBs**—Aroclor-1254 and Aroclor-1260
- **Metals**—aluminum, arsenic, barium, chromium, cadmium, cobalt, iron, lead, manganese, mercury, silver, vanadium, and zinc

3.2.2.1. Volatile Organic Compounds

Historically, vinyl chloride has been detected above the NC SSL at only one surface soil location immediately north and outside of the Site 16 boundary, adjacent to Sandy Branch (**Figure 3-2**). This area is outside of the disposal areas and was not identified as receiving waste materials. The affected sample was collected during RFI activities

in 1990 at a depth of 0.5 to 2.5 feet bgs in an area with a very shallow water table. It was suspected that the vinyl chloride detection was the result of a sample collected within the capillary fringe above the water table or where earlier groundwater level fluctuations had impacted soil immediately above the water table. As a result, a confirmation sample was collected in 2000 at the same location and vinyl chloride was not detected, verifying that the soil is not contaminated in this area. Since there is no evidence of waste disposal at this location, it is believed the vinyl chloride observed in the earlier soil sample is actually related to groundwater contaminant migration associated with the chlorinated VOC groundwater plume from upgradient sources (TetraTech, 2002) and the result of possible groundwater table fluctuations.

Benzene was detected above the NC SSL at only one soil sampling location in the southern part of Site 16; however, benzene was not detected in groundwater at adjacent or downgradient monitoring wells (MW12, MW48, and 16GW48). Methylene chloride was detected above the NC SSL within shallow soil at six locations, but was not detected in groundwater at downgradient monitoring wells.

3.2.2.2. Semivolatile Organic Compounds

PAHs were frequently detected in the shallow soil above the regulatory standards, with benzo(a)pyrene the most frequently detected (14 locations above the NC SSL and USEPA Adjusted Residential RSLs) (**Figure 3-3**).

Benzo(a)pyrene and benzo(b)fluoranthene were observed above the industrial soil RSLs of 210 and 2,100 micrograms per kilogram ($\mu\text{g}/\text{kg}$), with maximum concentrations of 1,100 $\mu\text{g}/\text{kg}$ and 2,400 $\mu\text{g}/\text{kg}$, respectively.

Benzo(a)anthracene was detected above the NC SSL and the USEPA Adjusted Residential RSL at three shallow soil locations. Benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene each exceeded their respective USEPA Adjusted Residential RSL. PAHs were not detected in groundwater in adjacent or downgradient monitoring wells.

The source of PAHs is likely associated with the former debris piles in the southern portion of the site, which have since been removed.

3.2.2.3. Pesticides

Elevated concentrations of pesticides above regulatory standards in soil included dieldrin, heptachlor epoxide and alpha-BHC, and are shown on **Figure 3-4**. Dieldrin was detected in 10 shallow soil samples above the NC SSLs, with a maximum concentration of 110 $\mu\text{g}/\text{kg}$ (equivalent to the industrial soil RSL of 110 $\mu\text{g}/\text{kg}$). Heptachlor epoxide and alpha-BHC were only detected above the NC SSL at one soil sample location each, but were not detected in site groundwater.

3.2.2.4. Polychlorinated Biphenyls

Aroclor-1254 was detected in soil at five locations and aroclor-1260 at six locations above the Residential RSL (110 $\mu\text{g}/\text{kg}$ and 220 $\mu\text{g}/\text{kg}$, respectively), with maximum concentrations of 340 and 510 $\mu\text{g}/\text{kg}$, respectively (**Figure 3-4**).

3.2.2.5. Metals

Metals were detected above the NC SSL and the Adjusted Residential and Industrial RSLs. In some cases, such as for cadmium, iron, and mercury, the average base-wide background concentrations are above the NC SSL and/or the USEPA Adjusted Soil RSLs. Therefore, only metals detected above two times the average basewide background and at least one of the screening levels (the NC SSLs or the USEPA Adjusted Soil RSLs) are discussed and shown on **Figure 3-5**.

- Aluminum was detected above the Adjusted Residential RSL (7,700 milligrams per kilogram [mg/kg]) and background concentration (10,160 mg/kg) at six locations, with a maximum concentration of 35,800 mg/kg.
- Arsenic was detected above the Adjusted Residential and Industrial RSLs (0.39 mg/kg and 1.6 mg/kg, respectively) at 12 locations. At seven of these locations, arsenic was also detected above the NC SSL (5.8 mg/kg). However, arsenic was detected up to a maximum concentration of 13.7 mg/kg in the MCAS Cherry Point background data set. Only two samples contained arsenic concentrations above the background range, with concentrations of 70.9 and 21.9 mg/kg. Naturally occurring arsenic is commonly found in volcanic derived sediments, adsorbed to metal oxides and clay-mineral surfaces, and associated with sulfide minerals and organic carbon.

- Barium was detected above the NC SSL (580 mg/kg) and background concentration (23 mg/kg) at one sample location with a concentration of 816 mg/kg. Barium is strongly influenced by the presence of sulfate, and generally occurs in sediment as barium sulfate. Precipitation of barium as an insoluble salt is accelerated in areas where water interacts with higher sulfate content water (such as with brackish water).
- Cadmium was detected above the Adjusted Residential RSL (7 mg/kg), NC SSL (3 mg/kg), and background concentration (1.128 mg/kg) at three surface soil locations, with a maximum concentration of 24.5 mg/kg.
- Chromium was detected above the NC SSL (3.8 mg/kg) and the Adjusted Residential and Industrial RSLs (0.29 mg/kg and 5.6 mg/kg, respectively) at 11 locations, with a maximum concentration of 131 mg/kg. Two times the average background concentration for chromium is 16.96 mg/kg. The sample analyses are for total chromium and did not provide results for chromium broken out in its separate valence states. Due to the historical land use at Site 16, it is unlikely that a substantial portion of the chromium detected in soil is in the form of the more toxic valence state, hexavalent chromium.
- Concentrations at nine surface soil sample locations exceeded the Adjusted Residential RSL for cobalt (2.3 mg/kg), with a maximum concentration of 5.5 mg/kg.
- Concentrations at 15 surface soil sample locations exceeded the NC SSL (150 mg/kg) for iron, with concentrations ranging from 6,560 mg/kg to 23,600 mg/kg.
- Lead was detected above the NC SSL (270 mg/kg) at one sample location, and above the NC SSL and the Adjusted Residential RSL (400 mg/kg) at a concentration of 708 mg/kg in another surface soil sample. The soil in which the elevated concentrations of lead had been found was removed as part the 1997 removal action.
- Concentrations at six surface soil sample locations exceeded the NC SSL for manganese (65 mg/kg), and three locations exceeded the NC SSL and the Adjusted Residential RSL (180 mg/kg), with concentrations ranging from 75.3 to 393 mg/kg. Manganese oxides are common from the weathering of volcanic derived sediments.
- Mercury was detected above the NC SSL (1 mg/kg) at two locations. One of the locations contained mercury at a concentration (14 J mg/kg) that also exceeded the Adjusted Residential RSL (2.3 mg/kg). Two times the base background concentration for mercury is 0.128 mg/kg.
- Silver was detected above the NC SSL (3.4 mg/kg) at one location with a concentration of 6.6 mg/kg.
- Vanadium was detected above the Adjusted Residential RSL (39 mg/kg) at five locations, with a maximum concentration of 51.1 mg/kg.
- Concentrations at three surface soil sample locations exceeded the NC SSL (1,200 mg/kg) for zinc. One of these locations contained zinc at a concentration of 2,390 mg/kg; exceeding the Adjusted Residential RSL (2,300 mg/kg).

3.2.3 Groundwater

Groundwater samples were collected in the surficial and Yorktown aquifers. The low mobility of the shallow soil contaminants at Site 16 and the lack of detections in groundwater indicate that constituents are not leaching from soil to groundwater. Debris piles and impacted soil have been removed and no longer contribute as a source of contamination. **Table 3-2** summarizes the COPCs in groundwater observed above screening criteria and the maximum concentrations detected at Site 16.

3.2.3.1. Volatile Organic Compounds

The presence of chlorinated VOCs in groundwater beneath Site 16 is well documented; however, the various investigations to date support the conclusion that the chlorinated VOC plume originates from upgradient source areas within OU1 and has migrated downgradient and extends beneath Site 16 (CH2M HILL, 2009b).

3.2.3.2. Semivolatile Organic Compounds

SVOCs were not detected in the surficial aquifer (TetraTech, 2002).

3.2.3.3. Pesticides

4,4-dichlorodiphenyldichloroethene (4,4-DDE) was detected in one monitoring well (OU1-MW12) at a concentration of 0.16 µg/L, slightly above the North Carolina Groundwater Quality Standard (NCGWQS) (0.1 µg/L) in 1994 (TetraTech, 2002). A subsequent sample in 2000 did not detect pesticides. The location with the elevated concentration of 4,4-DDE is shown on **Figure 3-6**. The 2002 OU1 RI concluded that the detection of 4,4-DDE is isolated and likely from normal basewide pesticide application and not from Site 16 activities. Pesticides were not detected in the downgradient monitoring well 16GW48.

3.2.3.4. Polychlorinated Biphenyls

No PCBs have been detected in the surficial aquifer.

3.2.3.5. Metals

Only metals detected above two times the average base-wide background and the NCGWQS are discussed below and shown on **Figure 3-6**.

Only one monitoring well (OU1-MW12) within the area of impacted soil contained detections exceeding the NCGWQS for iron (300 micrograms per liter [µg/L]). Two additional monitoring wells located northeast and northwest exceeded the NCGWQS for iron with a maximum concentration of 72,650 µg/L. Manganese exceeded the NCGWQS (50 µg/L) at six monitoring well locations (northwest, northeast, and southeast of Site 16) with a maximum concentration of 377.5 µg/L. Thallium exceeded the NCGWQS (0.2 µg/L) and two times the average base background concentration (0.96 µg/L) at four monitoring well locations (northwest of Site 16). In the OU1 RI Report, manganese and iron were the two inorganics detected above regulatory criteria most frequently within the surficial aquifer (over 60 detections of manganese above criteria, over 40 detections of iron above criteria). In addition to comparisons of sample data for these constituents to background concentrations, it was concluded that the widespread distribution of similar concentrations above criteria for these two constituents, across all of OU1 rather than in the form of a plume, indicates that they are naturally occurring at the concentrations found at Site 16. Detections of thallium in the groundwater at OU1 above regulatory criteria appear to be the result of false positives that have been attributed to the utilized CLP laboratory method which has been acknowledged by EPA to result in elevated concentrations for arsenic, lead, and thallium (TetraTech, 2002).

3.2.4 Surface Water and Sediment

Surface water and sediment samples were collected from East Prong Slocum Creek and Sandy Branch as part of the 2002 OU1 RI (TetraTech, 2002). VOCs, SVOCs, PCBs, pesticides, and metals were observed in surface water and sediment at each surface water body located adjacent to Site 16.

Only manganese at Sandy Branch and chlordane, arsenic, manganese, and thallium at East Prong Slocum Creek, were observed in surface water above the North Carolina Surface Water Quality Standards (NC2B Standards). However, detected thallium concentrations are a result of false positive detections from the laboratory analytical technique previously used. Arsenic and manganese were determined to be likely associated with background conditions. Chlordane was detected at a concentration of 0.0057 µg/L, slightly above the NC2B Standard (0.004 µg/L) in only one of seven surface water samples (TetraTech, 2002).

PAHs, pesticides, arsenic, antimony, cadmium, copper, chromium, lead, iron, mercury, nickel, silver, and zinc were observed at concentrations in sediment exceeding screening criteria within Sandy Branch. PAHs, pesticides, PCBs, arsenic, cadmium, copper, iron, manganese, aluminum, and cyanide were observed above screening criteria within sediment of East Prong Slocum Creek (TetraTech, 2002).

3.3 Chemical Fate and Transport

This subsection discusses the fate and transport of chemicals observed in soil and groundwater at Site 16. Fate and transport consists of the identification of theoretical chemical phases and migration and degradation pathways. An understanding of the mobility and persistence of a chemical in the subsurface is part of the overall assessment of the potential for that chemical to cause an adverse human health or environmental effect.

Contaminant transport mechanisms within soil include several mechanisms. Contaminated soils may be released to the environment via wind erosion of loose soil particles that are carried downwind of their source. Contaminants with relatively high vapor pressures may be released to the atmosphere via volatilization. Precipitation can generate overland flow, which can erode and transport contaminated soil along topographic gradients. Downward vertical migration within the soil will depend on the water solubility of the chemical and its affinity to sorb to soil organic matter. Water percolation and leaching through the soils may also contribute to groundwater migration.

The soil contaminants at Site 16 include PAHs, pesticides/PCBs, and metals. Wind erosion can result in contaminant transport in areas with no artificial cover (asphalt or concrete), grass or other vegetative cover. The areas of Site 16 where surface or shallow sub-surface contaminants were found are in heavily wooded areas that inhibit wind erosion and minimize the potential for surface runoff and erosion.

PAHs tend to bind to soil and are not likely to leach into groundwater. Pesticides and PCBs are generally extremely persistent in the environment and also tend to adsorb to soil particles and not leach into groundwater. Metals are highly persistent environmental contaminants. They do not biodegrade, photolyze, or hydrolyze. The major fate mechanism for metals is adsorption to the soil matrix. Vertical migration of these contaminants from the shallow soil to the groundwater and eventually to surface water has not occurred to date despite the very shallow depth to groundwater, and is unlikely to occur in the future.

For these reasons, surface soil runoff has the highest likelihood for the transport of PAHs, pesticides, PCBs, and metals to adjacent surface water bodies, where they would be likely to settle in the sediment.

Table 3-1

Constituents of Potential Concern in Soil
Site 16, MCAS Cherry Point, North Carolina

| | Chemical | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Background Value | Applicable Regulatory Standard |
|-----------------|------------------------|---|-------|---|---------------------|--------------------------------------|
| VOCs | Benzene | 11 J * | UG/KG | SO10-0001 | NA | 7.3 (2) |
| | Methylene Chloride | 61 | UG/KG | SO05-0001 | NA | 23 (2) |
| | Vinyl Chloride | 46 ** | UG/KG | OU1-SB05 | NA | 0.19 (2) |
| SVOCs | Benzo(a)anthracene | 450 J | UG/KG | OU1-SS-101-04B | NA | 150 (3) |
| | Benzo(a)pyrene | 1,100 J | UG/KG | OU1-SS-101-04B | NA | 15 (3) |
| | Benzo(b)fluoranthene | 2,400 J | UG/KG | OU1-SS-101-04B | NA | 150 (3) |
| | Benzo(k)fluoranthene | 2,100 J | UG/KG | OU1-SS-101-04B | NA | 1500 (3) |
| | Dibenz(a,h)anthracene | 56 J | UG/KG | SO08-0001 | NA | 15 (3) |
| | Indeno(1,2,3-cd)pyrene | 170 J | UG/KG | SO08-0001 | NA | 150 (3) |
| Pesticides/PCBs | alpha-BHC | 4.5 | UG/KG | OU1-SO-SS104-04B | NA | 1.2 (2) |
| | Aroclor-1254 | 340 | UG/KG | SO08-0001 | NA | 110 (3) |
| | Aroclor-1260 | 510 | UG/KG | SO07-0001 | NA | 220 (3) |
| | Dieldrin | 110 | UG/KG | OU1-SS-101-04B | NA | 0.81 (2) |
| | Heptachlor epoxide | 3 | UG/KG | SO09-0001 | NA | 0.82 (2) |
| Metals | Aluminum | 35,800 | MG/KG | OU1-SO-SS2-0001 | 10,160 | 7700 (3) |
| | Arsenic | 70.9 J | MG/KG | OU1-SO-SS1-0001 | 3.9 | 0.39 (3) |
| | Barium | 816 | MG/KG | OU1-SS-101-04B | 23 | 580 (2) |
| | Cadmium | 24.5 | MG/KG | SO05-0001 | 1.1 | 3 (2) |
| | Chromium | 131.0 | MG/KG | SO07-0001 | 17 | 0.29 (3) |
| | Cobalt | 5.9 | MG/KG | OU1-SO-SS1-0001 | 2.4 | 2.3 (3) |
| | Iron | 23,600 | MG/KG | OU1-SO-SS1-0001 | 5,959 | 150 (2) |
| | Lead | 708 | MG/KG | SB04-0102 | 10.5 | 270 (2) |
| | Manganese | 393 | MG/KG | OU1-SO-SS4-0001 | 16.7 | 65 (2) |
| | Mercury | 14 J | MG/KG | OU1-SO-SS1-0001 | 0.13 | 1 (2) |
| | Silver | 6.6 | MG/KG | SO04-0001 | 0.8 | 3.4 (2) |
| | Vanadium | 93.1 | MG/KG | OU1-SO-SS2-0001 | 19.2 | 39 (3) |
| | Zinc | 2,970 | MG/KG | OU1-SO-SS3-0001 | 11.3 | 1200 (2) |

Notes

1 - Maximum detected concentration

2 - North Carolina Soil Screening Levels (January 2010)

3 - USEPA Residential Regional Screening Levels for Soil Adjusted (November 2010)

J - estimated value

UG/KG - micrograms per kilogram

MG/KG - milligrams per kilogram

VOCs - volatile organic compounds

SVOCs - semi-volatile organic compounds

PCBs - polychlorinated biphenyls

* Benzene was identified at a value between the method detection limit and the reporting limit, indicating an estimated concentration.

**It was concluded in the RI for OU1 (TetraTech, 2002) that this result is not representative of soil but rather groundwater contamination from migration of the chlorinated VOC plume from upgradient sources and possible fluctuations of a shallow groundwater table. A confirmation sample was collected in 2000 at the same location, and vinyl chloride was not detected, verifying that soil is not contaminated in this area.

Table 3-2

Constituents of Potential Concern in Groundwater

Site 16, MCAS Cherry Point, North Carolina

| | Chemical | Maximum Concentration Qualifier | Units | Location of Maximum Concentration | Background Value | Applicable Regulatory Standard |
|------------|-----------|---------------------------------|-------|-----------------------------------|------------------|--------------------------------|
| Pesticides | 4,4 DDE | 1.6 | UG/L | OU1-MW12 | NA | 0.1 (1) |
| Metals | Iron | 6,820 | UG/L | OU1-MW12 | 4,740 | 300 (1) |
| | Manganese | 377.5 | UG/L | OU1-S3W3 | 93.4 | 50 (1) |
| | Thallium | 10 | UG/L | OU1-MW45 | 0.96 | 0.2 (1) |

Notes

1 - North Carolina Groundwater Quality Standards (Jaunuary 2010)

J - estimated value

UG/L - micrograms per liter

VOCs - volatile organic compounds

NA - data not available

4,4-DDE - 4,4 dichlorodiphenyldichloroethylene

Chlorinated VOCs are a result of upgradient sources and are being addressed separately, and therefore not included.

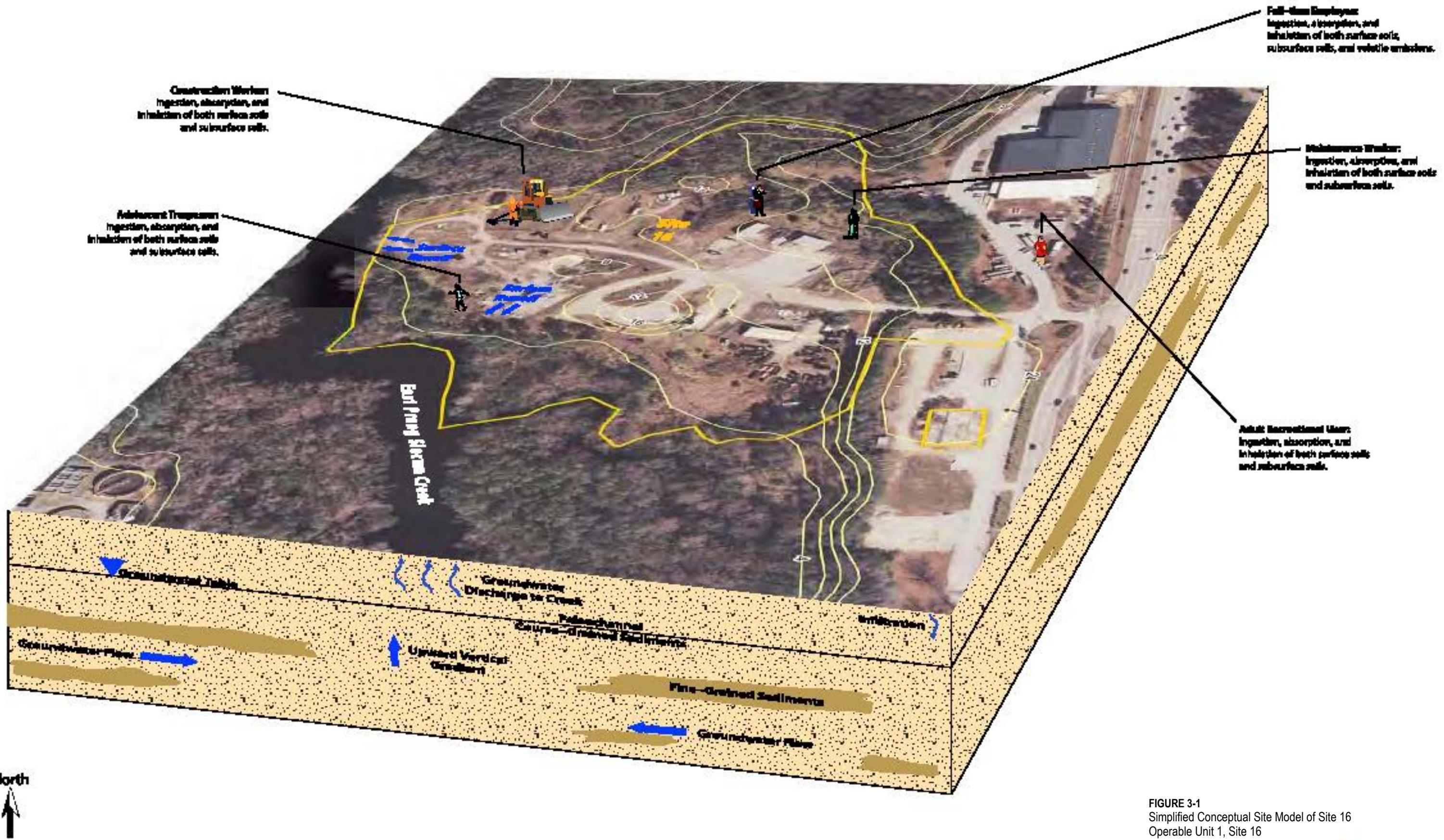


FIGURE 3-1
Simplified Conceptual Site Model of Site 16
Operable Unit 1, Site 16
MCAS Cherry Point, NC

**Legend**

- Soil Boring Location with NC SSL Exceedance
- Soil Boring Location with no Exceedance of Screening Criteria
- Monitoring Well
- Surface Water
- ▨ 1997 Excavated Area (Debris Piles Removal Action)
- Site 16 Boundary

Notes:
Shading Exceeds NC SSL

J - Analyte present, value may or may not be accurate or precise

NC SSL - North Carolina Soil Screening Levels

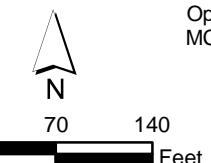
RSL - Regional Screening Levels

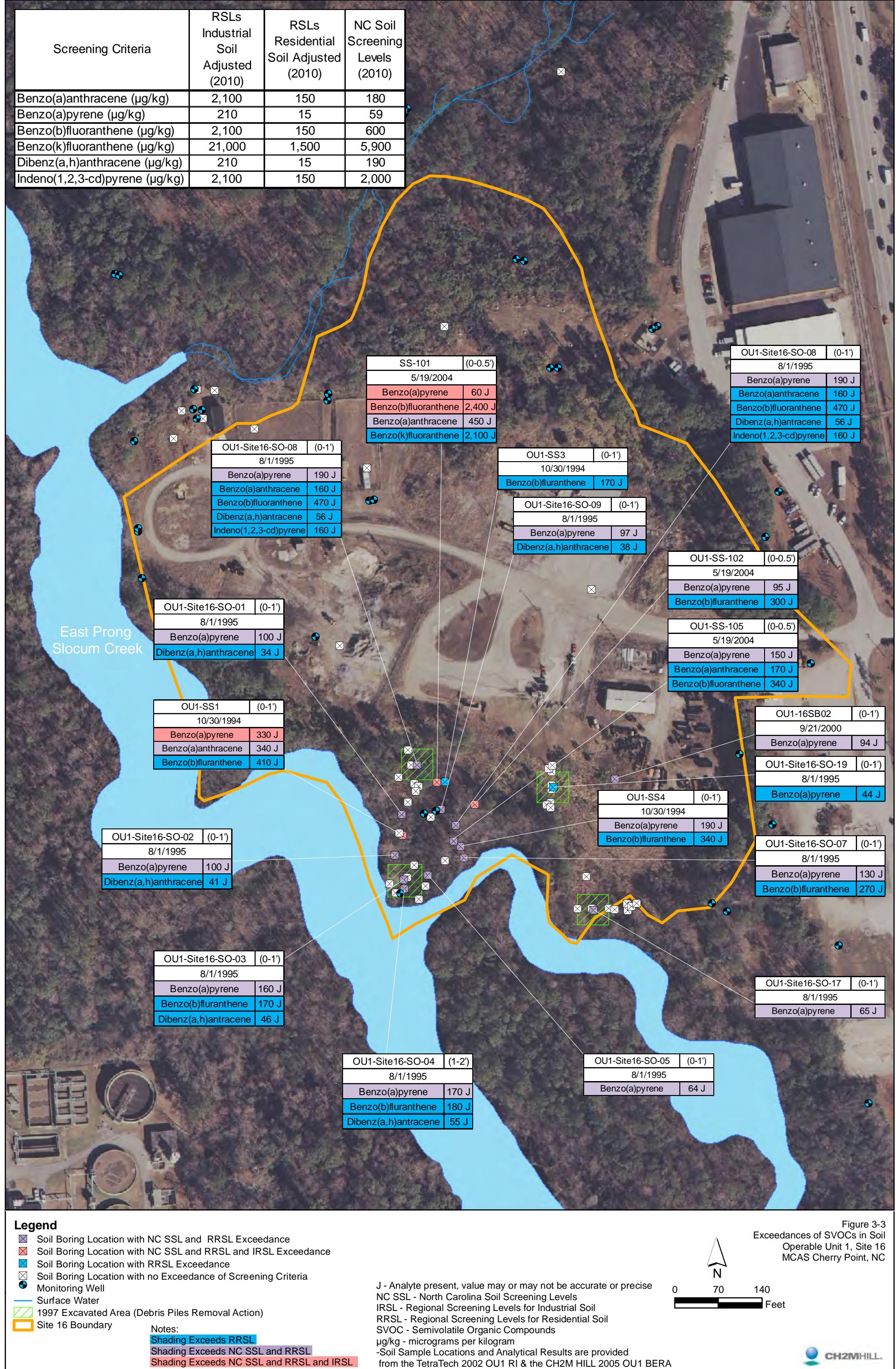
VOC - Volatile Organic Compounds

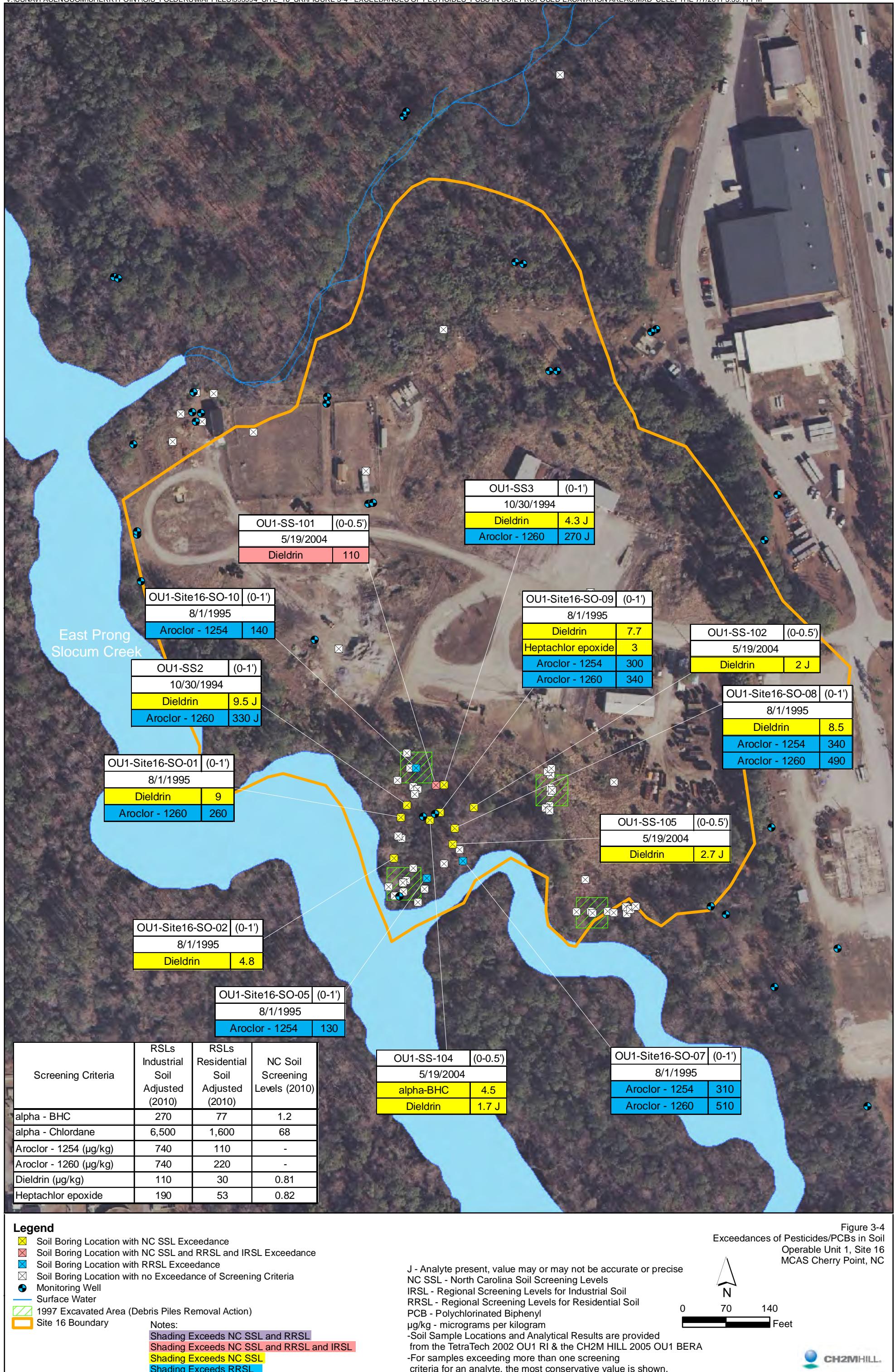
$\mu\text{g}/\text{kg}$ - micrograms per kilogram

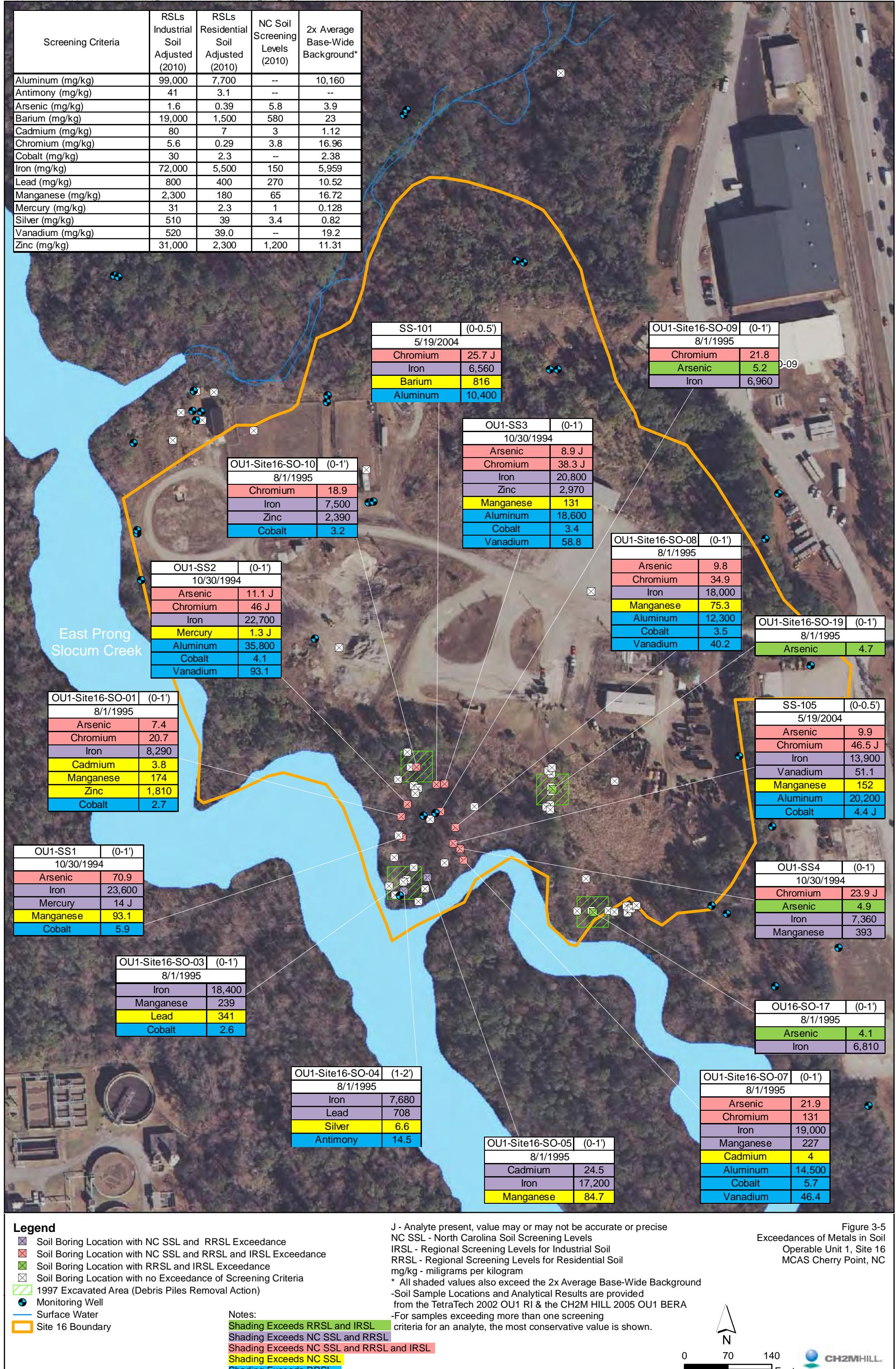
-Soil Sample Locations and Analytical Results are provided from the TetraTech 2002 OU1 RI & the CH2M HILL 2005 OU1 BERA

Figure 3-2
Exceedances of VOCs in Soil
Operable Unit 1, Site 16
MCAS Cherry Point, NC











SECTION 4

Human Health Risk Assessment Summary

An updated HHRA was prepared using the Site 16 soil data collected during the 2002 OU1 RI from October 1994 through September 2000 along with eight surface soil samples collected for the 2005 BERA in May 2004. Human health risks associated with exposure to constituents detected in soil were evaluated for potential exposure pathways based on existing site conditions and current and potential future site use. The complete updated HHRA technical memorandum is included in **Appendix A**.

The HHRA used current risk assessment methods, updated as necessary from the risk assessment methodology used for the 2002 OU1 RI HHRA. The screening levels used to select the COPCs for further quantitative evaluation in the risk assessment were updated from the values used in 2002 OU1 RI (the USEPA Region 9 preliminary remediation goals) to the current USEPA RSL table values (USEPA, 2010). The exposure factors used to calculate daily intake values were updated to currently used values, if necessary. Also, in the 2002 OU1 RI, soils at Sites 5, 16, and 83 were evaluated as one soil group. This HHRA evaluated only soil samples collected at Site 16.

4.1 Constituents of Potential Concern

Soil data evaluated in the 2002 RI included only samples collected from October 1994 through September 2000. These data were evaluated in the updated HHRA along with eight surface soil samples collected for the 2005 BERA in May 2004. All of the soil data were evaluated as one exposure group (total soil). Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, and total petroleum hydrocarbon (TPH) compounds. TPH data were not evaluated in the HHRA; however, individual compounds which are components of TPHs (SVOCs and VOCs) were evaluated.

Detected constituents were screened by comparing analytical results with health-based criteria for soil and ambient air. The maximum detected concentration of each constituent in each medium was compared to the USEPA residential soil RSLs and residential air RSLs. If the maximum concentration exceeded the criteria, the constituent was selected as a COPC.

Following USEPA Region 4 risk assessment guidance (USEPA, 2000), any member of a chemical class that was detected that had other members selected as COPCs was retained as a COPC (i.e., if one carcinogenic PAH was selected as a COPC, since the maximum detected concentration exceeded the screening level, all detected PAHs were retained as COPCs).

The constituents that exceeded residential soil or air RSLs were selected as COPCs and are identified in Table 2 of **Appendix A**.

4.2 Exposure Evaluation

Based upon the exposure assessment, the current and future land use exposure routes for quantitative evaluation for Site 16 included the following:

- **Industrial worker**—Incidental ingestion of and dermal contact with soil and inhalation of particulate emissions from soil.
- **Maintenance worker**—Incidental ingestion of and dermal contact with soil and inhalation of particulate emissions from soil.
- **Trespasser/visitor (adult, adolescent, and child)**—Incidental ingestion of and dermal contact with soil and inhalation of particulate emissions from soil.
- **Construction worker**—Incidental ingestion of and dermal contact with soil and inhalation of particulate emissions from soil.

- **Hypothetical Resident (adult and child)**—Incidental ingestion of and dermal contact with soil and inhalation of particulate emissions from soil.

4.3 Risk Estimates

USEPA's target range for excess lifetime cancer risk (ELCR) associated with CERCLA sites is 1 in 10,000 (1×10^{-4}) to 1 in 1,000,000 (1×10^{-6}). Similarly, the target noncancer HI is 1.0 or less. Risk estimates were calculated for potential receptors and exposure pathways using conservative assumptions for exposure factors and exposure point concentrations.

The results of the HHRA indicate that for both current and potential future land use, Site 16 does not pose unacceptable health risks to any of the receptors evaluated in this HHRA. Contact with soil would not result in noncarcinogenic hazards above the USEPA target HI of 1 or carcinogenic risks above the USEPA target range of 1×10^{-6} to 1×10^{-4} .

The risk assessment assumed that a lifetime resident could be exposed to soil through incidental ingestion and dermal contact. Contact with soil would result in a carcinogenic hazard above the USEPA target range of 1×10^{-6} to 1×10^{-4} with a risk of 2×10^{-4} . Arsenic, chromium, and PAHs are the main contributors to the total risk. In order to provide a perspective on the total risk, additional calculations were performed to demonstrate potential risk from site-related levels of contaminants (levels of metals above background) and adjustments to the chromium toxicity factors.

Arsenic was detected above the Adjusted Residential and Industrial RSLs (0.39 mg/kg and 1.6 mg/kg, respectively) at 12 locations. However, arsenic was detected up to a maximum concentration of 13.7 mg/kg in the MCAS Cherry Point background data set. Only two samples contained arsenic concentrations above the background range, with concentrations of 70.9 and 21.9 mg/kg. Therefore, arsenic is likely associated with naturally occurring background conditions at Site 16. If the carcinogenic risk associated with exposure to soil is calculated without arsenic (assuming arsenic is associated with background conditions), the potential risk would fall within the target risk range (1×10^{-4} , at the upper end of the range).

In addition, the carcinogenic risk is likely to be overestimated because the toxicity value for hexavalent chromium (the more toxic valence state of chromium) was used to evaluate total chromium in soil since the sample analyses did not provide results for chromium broken out in its separate valence states. However, it is unlikely that a substantial portion of the chromium detected in soil is in the form of hexavalent chromium due to known past historical land use at Site 16. A reasonable estimation of the likely percentage of hexavalent chromium can be obtained from a recently completed background soil investigation at nearby Marine Corps Base Camp Lejeune (MCB CamLej), which is also located within the Atlantic Coastal Plain of North Carolina and has similar underlying geology. The MCB CamLej background study compared the ratios of hexavalent chromium to the more benign trivalent chromium in background soil samples and calculated background threshold values (BTVs) for both hexavalent and trivalent chromium in various soil types and locations. The BTV ratios for hexavalent to total (hexavalent plus trivalent) chromium ranged from 0.0991 to 0.3684 (depending on soil type and area) and averaged 0.1575. Using the highest (most conservative) ratio in the study, the maximum estimated percentage of hexavalent chromium would be approximately 37 percent and the average would be less than 1 in 6. If the carcinogenic risk associated with exposure to soil were calculated using a 1 to 6 ratio of hexavalent chromium to total chromium (which the MCB CamLej background soil study supports), it would fall within the target risk range (7×10^{-5}).

SECTION 5

Conclusions and Proposed Path Forward

The overall objective of this SRI is to present the data and findings obtained from historical and recent investigations conducted to characterize the nature and extent of contamination in soil and groundwater, assess potential risks to human health associated with exposure to site soil, and summarize the potential risks to human health from exposure to groundwater and potential risks to the environment.

This section presents the conclusions of the SRI conducted at Site 16 and the proposed path forward for the site.

5.1 Conclusions

5.1.1 Physical Characteristics

- The topography of Site 16 is relatively flat, but slopes downward in a westerly direction towards East Prong Slocum Creek.
- Groundwater within the surficial aquifer at Site 16 was encountered at depths ranging from 3 to 7 feet bgs. Groundwater flows generally westward and discharges to East Prong Slocum Creek and Sandy Branch.

5.1.2 Environmental Media Contamination

Analytical data collected during the 2002 OU1 RI, OU1 RI Addendum, and the OU1 BERA provide the primary basis for the evaluation of the nature and extent of VOCs, SVOCs, Pesticides, PCBs, and metals contamination in soil, groundwater, surface water and sediment:

- VOCs
 - VOCs exceeding the adjusted residential and industrial RSLs and the NC SSLs in soil were vinyl chloride, benzene, and methylene chloride. The majority of exceedances were found within the SW AOEC. Benzene and methylene chloride were not detected in site groundwater above screening criteria.
 - Vinyl chloride was concluded to be to the result of groundwater contaminant migration associated with the chlorinated VOC groundwater plume from upgradient sources and will therefore be addressed separately as part of the OU1 Central Groundwater Plume FS.
- SVOCs
 - SVOCs exceeding both the residential and industrial RSLs and the NC SSLs in soil and sediment were benzo(a)pyrene and benzo(b)fluoranthene. The majority of exceedances were found within the SW AOCE. Benzo(a)pyrene was the most frequently detected SVOC above screening criteria, with a maximum concentration of 1,100 µg/kg.
 - Although each SVOC exceeded the NC SSL in one or more soil samples, no SVOCs were detected in groundwater.
- Pesticides
 - Pesticides exceeding the adjusted residential and industrial RSL and NC SSL in soil were dieldrin, heptachlor epoxide, and alpha-BHC. Dieldrin was detected in 10 shallow soil samples above the NC SSLs, with a maximum concentration of 110 µg/kg (equivalent to the industrial soil RSL of 110 µg/kg). Heptachlor epoxide and alpha-BHC were only detected above the NC SSL at one soil sample location each. The most frequently observed pesticides were within surface soils in the SW AOEC.
 - 4,4-DDE was detected in one monitoring well at a concentration of 0.16 µg/L, slightly above the NCGWQS (0.1 µg/L) in 1994 (TetraTech, 2002). A subsequent sample in 2000 did not detect pesticides. The 2002

OU1 RI concluded that the detection of 4,4-DDE is isolated and likely from normal basewide pesticide application and not from Site 16 activities.

- Chlordane was observed in surface water above the NC2B Standard at East Prong Slocum Creek, and in sediment at a location in the vicinity of Site 83.
- PCBs
 - Aroclor-1254 was detected in soil at five locations and aroclor-1260 at six locations above the residential RSL (110 µg/kg and 220 µg/kg, respectively), with maximum concentrations of 340 and 510 µg/kg, respectively. The most frequently observed pesticides were within surface soils in the SW AOEC.
 - PCBs were not detected above screening criteria in groundwater or surface water, but were detected above screening criteria in sediment.
- Metals
 - Metals exceeding both background concentration and screening criteria in soil included aluminum, arsenic, barium, cadmium, chromium, cobalt, iron, lead, manganese, mercury, silver, vanadium, and zinc.
 - Only one monitoring well within the area of impacted soil contained detections of manganese and iron exceeding the NCGWQS. The 2002 OU1 RI concluded that the widespread distribution of detections above screening criteria for these two compounds, across all of OU1, indicates they are naturally occurring at the concentrations found.
 - Only manganese at Sandy Branch and arsenic, manganese, and thallium at East Prong Slocum Creek, were observed in surface water above the NC2B Standards. However, detected thallium concentrations are a result of false positive detections from the laboratory analytical technique previously used. Arsenic and manganese were determined to be likely associated with background conditions.
 - Arsenic, antimony, cadmium, copper, chromium, lead, iron, mercury, nickel, silver, and zinc were observed at concentrations in sediment exceeding screening criteria within Sandy Branch. Arsenic, cadmium, copper, iron, manganese, aluminum, and cyanide were observed above screening criteria within sediment of East Prong Slocum Creek.

5.1.3 Contaminant Migration

The contaminants in the soil of Site 16 include PAHs, pesticides/PCBs, and metals. The areas of Site 16 with surface or shallow sub-surface contaminants are in heavily wooded areas that inhibit wind erosion and minimize surface runoff and erosion.

PAHs tend to bind to soil and are not likely to leach into groundwater. Pesticides, PCBs are generally extremely persistent in the environment and tend to adsorb to the soil particles. Metals are highly persistent environmental contaminants. They do not biodegrade, photolyze, or hydrolyze. The major fate mechanisms for metals are adsorption to the soil matrix. Vertical migration of all of these contaminants from the shallow soil to the groundwater and eventually to surface water is unlikely.

Surface soil runoff has the highest likelihood to transport PAHs, pesticides, PCBs, and metals to adjacent surface water bodies, where they are likely to settle in the sediment.

5.1.4 Human Health Risk Assessment

An updated HHRA was conducted for Site 16 soil to evaluate the magnitude and probability of actual or potential harm to human health posed by contamination at the site. The HHRA evaluated potential current and future health risks from exposure to soil.

Contact with soil and inhalation of soil particles would not result in noncarcinogenic hazards above the USEPA target HI of 1 or carcinogenic risks above the USEPA target range of 1×10^{-6} to 1×10^{-4} , except for the lifetime resident, where contact with soil would result in a carcinogenic hazard of 2×10^{-4} . Arsenic, chromium, and PAHs

are the main contributors to the total risk. However, because arsenic concentrations at Site 16 are consistent with natural background conditions and the risk assessment considered all detected chromium to be the more toxic hexavalent chromium (not a realistic assumption), additional calculations were performed. It was determined that if the carcinogenic risk associated with exposure to soil is calculated without arsenic (assuming arsenic is associated with background), the potential risk would fall within the target risk range (1×10^{-4} , at the upper end of the range). Separately, if the carcinogenic risk associated with exposure to soil were calculated using a 1 to 6 ratio of hexavalent chromium to total chromium (a percentage supported by a background study at nearby MCB CamLej), it would fall within the target risk range (7×10^{-5}).

Risks associated with exposure to groundwater were evaluated OU1-wide for the surficial, Yorktown, and Castle-Hayne aquifers. Risks were also evaluated OU1-wide for surface water and sediment exposures.

Potential unacceptable risks were identified for potential future potable use of groundwater from the surficial aquifer, due to chlorinated VOCs, carcinogenic PAHs, arsenic, iron, and thallium. The carcinogenic PAHs were mainly detected in one monitoring well upgradient of Site 16. Arsenic and iron were determined to be associated with background conditions and the occurrence of thallium was attributed to false-positive detections related to the laboratory analytical method. No risk was identified for the Yorktown and Castle Hayne aquifers (TetraTech, 2002). Chlorinated VOCs are being addressed as part of the OU1 Central Groundwater Plume FS (CH2M HILL, 2011a).

The estimated cancer risk for exposure to OU1 sediments by child residents and lifetime residents exceeded USEPA's target levels. The risk was associated with PAHs observed in one sediment sample within Schoolhouse Branch, not adjacent to Site 16. All other receptors potentially exposed to sediment were below or within the USEPA target risk range of 10^{-4} and 10^{-6} and HIs were below the acceptability threshold of 1.0. All receptors potentially exposed to surface water were below or within the USEPA target risk range of 10^{-4} and 10^{-6} and HIs were below the acceptability threshold of 1.0 (TetraTech, 2002).

5.1.5 Ecological Risk Assessment

The OU1 BERA (CH2M HILL, 2005) concluded that there are no site-related risks for ecological receptors within Site 16.

5.2 Proposed Path Forward

The data collected at Site 16 indicate that the environmental media have been adequately characterized. Based on the current site conditions, no potential unacceptable risks to human health or the environment exist from site-related contamination. In addition, the former removal actions eliminated potential future sources of contamination (i.e., debris) as well as soil containing contaminant concentrations posing potentially unacceptable risks to human health and/or ecological receptors. As a result, no further action is warranted for Site 16. It is recommended that the site proceed to a No Further Action Proposed Plan and Record of Decision.

SECTION 6

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**Appendix A
Summary of the
Updated Human Health Risk Assessment
Site 16, Operable Unit 1**

Response to Comments

Draft Technical Memorandum Summary of the Updated Human Health Risk Assessment

OU1, Site 16

MCAS Cherry Point, North Carolina

June 1, 2011

Comments received by email on May 5, 2011 from George Lane, North Carolina Department of Environment and Natural Resources (NCDENR) and on May 3, 2011 from Gena Townsend, U.S. Environmental Protection Agency (USEPA).

NCDENR Comments

1. Table 2.1: A spot check of this table revealed that the screening toxicity values for acenaphthene, fluoranthene, and pyrene are an order of magnitude too low. Please double check this table for accuracy.

Navy Response: The screening toxicity values were checked on Table 2.1 and all of the noncancer screening levels were corrected. This revision did not result in any change to the COPC selection.

2. Tables 2.1 and 2.2: Since one carcinogenic PAH (cPAH) was retained as a COPC, all cPAHs should be retained in each of these tables.

Navy Response: All cPAHs were retained except chrysene. This cPAH has been added to the COPC list and carried throughout the risk assessment process.

3. There appear to be a number of tables missing from the risk assessment, starting with tables 7.x. Please double check and resubmit so this document can be reviewed.

Navy Response: The missing Table 7s and Table 9s have been added to the file.

EPA Comments

1. In an effort to make a thorough assessment of the data, a site figure and/or table should be included showing the sample locations and concentrations. This is especially important in reviewing the arsenic and chromium areas. It will show if the sample hits are in a concentrated area or are sporadically throughout the site. The document also describes the past methods of evaluating Chromium, I am not sure if that discussion is relevant in evaluating present site conditions. Is it possible to reanalyze the data for Chromium VI?

Navy Response: A table was developed and included as Attachment 2 that displays the concentrations for the sample locations used in this updated HHRA TM. A site figure will be included in the Site 16 SRI, which this TM will ultimately become an Appendix to. The text was revised to address the evaluation of chromium.

Summary of the Updated Human Health Risk Assessment – OU1 Site 16, Marine Corps Air Station Cherry Point, North Carolina

PREPARED FOR: MCAS Cherry Point Tier 1 Partnering Team
FROM: CH2M HILL
DATE: June 1, 2011

This technical memorandum (TM) presents an updated human health risk assessment (HHRA) for Site 16, located within Operable Unit (OU) 1 at Marine Corps Air Station (MCAS) Cherry Point, North Carolina. A baseline HHRA was performed for OU1, which included Site 16, in the Remedial Investigation (RI) prepared by Tetra Tech NUS, Inc. (Tetra Tech) in November 2002 (denoted as the 2002 RI in this TM). However, in the 2002 RI, soil at Sites 16 and 83 and Base Realignment and Closure (BRAC) Site 5 were evaluated collectively as one soil exposure grouping. This TM provides an updated human health risk assessment of the soil data collected only from within Site 16, which includes data from the 2002 RI, and from eight soil samples collected during the later Baseline Ecological Risk Assessment (BERA) (CH2M HILL, 2005).

The risk assessment methodology presented in this TM uses current risk assessment methods and updates the baseline HHRA in the 2002 RI, as necessary. Screening levels used to select the chemicals of potential concern (COPCs) for further quantitative evaluation in this HHRA included the current USEPA Regional Screening Levels (RSLs) (USEPA, 2010a) rather than the former USEPA Region 9 preliminary remediation goals previously used in the 2002 RI. In addition, the exposure factors used to calculate daily intake were updated to reflect current exposure factors, if necessary. The exposure point concentrations (EPCs) were calculated as a 95 percent upper confidence limit (UCL) of the arithmetic mean using the revised data set, and using the most recent version of ProUCL, Version 4.00.005 (USEPA, 2010b).

1 Site Background

Site 16 is approximately 19 acres in size and located along the western portion of OU1. The site is bounded to the north by Sandy Branch, to the west by East Prong Slocum Creek, to the south by a wetland area and unnamed tributary to East Prong Slocum Creek, and to the east by a road off Roosevelt Boulevard. Site 16 is a former borrow pit area that was subsequently used as a dump site for construction debris. The site is currently used for storage and solid waste handling (i.e., transfer) and to store bulk materials (e.g., rip-rap, gravel, fill dirt, mulch). In the past, it was used for solid waste recycling activities, but these activities are no longer occurring at the site. There are several buildings and a vehicle impoundment storage lot located on the site.

In 2002, a RI was conducted to determine the nature and extent of contamination at OU1, and to determine whether the contamination presented an unacceptable risk to human

health or the environment at OU1. Data from historical site investigations were used in conjunction with additional soil, sediment, groundwater, and surface water samples collected for the RI.

Potential unacceptable risks to human health from exposure to polycyclic aromatic hydrocarbons (PAHs) and pesticide compounds in soil were identified at the area of Sites 16, 83, and BRAC Site 5 for the hypothetical future resident and future construction workers. An additional evaluation of potential environmental risk was recommended for this area. Since the data evaluated for potential risks to human health were grouped with data from other sites, the potential risks to human health were re-evaluated for Site 16. The potential risks to Site 83 are being evaluated separately.

2 Human Health Risk Evaluation

Human health risks associated with exposure to constituents detected in soil were evaluated for potential exposure pathways based on existing site conditions and current and potential future site use. A risk assessment for exposure to groundwater at this site is presented in the OU1 RI Addendum (CH2M HILL, 2008). The pathways evaluated in the HHRA are identified in **Attachment 1, Table 1**.

2.1 Data Summary and Evaluation

Soil data evaluated in the 2002 RI included samples collected from October 1994 through September 2000. These data are evaluated in this updated HHRA, along with eight surface soil samples collected for the 2005 BERA in May 2004. All of the soil data were grouped into one exposure group (total soil). Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, and total petroleum hydrocarbon (TPH) compounds. TPH was not evaluated in the HHRA; however, the components of TPHs (SVOCs and VOCs) were evaluated. **Table 1** lists the samples that were evaluated in the HHRA. **Attachment 2** contains the analytical data for each sample used in this updated evaluation.

2.2 Selection of Chemicals of Potential Concern

All of the detected constituents were screened following the procedures described below. The maximum detected concentration of each constituent in each exposure medium was compared to the criteria discussed below to select the COPCs for the medium. If the maximum concentration exceeded the criteria, the constituent was selected as a COPC.

- **Comparison with Health-based Criteria for Soil:** Soil data were compared to both the USEPA residential soil RSLs (USEPA 2010a) and the industrial soil RSLs. RSLs based on noncarcinogenic effects were divided by 10 to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table. Although land use is expected to remain industrial, data were compared to residential RSLs because they are protective of all potential receptors, in particular the youth and child trespassers.
- **Comparison with Background Levels for Soil:** Maximum concentrations of metals were compared with two times the average background concentrations as established in the *Background Evaluation Report for Marine Corps Air Station, Cherry Point, NC* (TtNUS, October 1999).

- **Comparison with Health-based Criteria for Ambient Air:** Calculated concentrations of chemicals in air emanating from contaminated soil by volatile and fugitive dust emissions were compared to the USEPA residential air RSLs. RSLs based on noncarcinogenic effects were divided by ten to account for exposure to multiple constituents. RSLs based on carcinogenic effects were used as presented in the RSL table. The ambient air concentrations were calculated following USEPA's soil screening guidance (USEPA 2002a), as shown in **Attachment 1, Table 2.3**.

The COPC screening is presented in **Attachment 1, Tables 2.1 through 2.3**. For constituents without available RSLs, surrogate constituents were identified and RSLs for those constituents were used for the screening. These constituents, and the surrogates used, are identified in **Attachment 1, Tables 2.1 through 2.3**. The constituents that exceeded residential soil or air RSLs were selected as COPCs and are identified in **Table 2**.

2.3 Exposure Assessment

Exposure assessment is the estimation of the likelihood, magnitude, frequency, duration, and routes of exposure to a chemical. Exposure refers to the potential contact of an individual (or receptor) with a chemical. Exposure can occur when contaminants migrate from a source to an exposure point, or when a receptor comes into direct contact with contaminated media.

The three components of exposure assessment include:

- Characterization of exposure setting
- Identification of exposure pathways
- Quantification of exposure

2.3.1 Characterization of Exposure Setting

A description of Site 16 was provided in Section 1. MCAS Cherry Point is part of a military installation just north of the town of Havelock in Craven County, North Carolina. The primary military land uses at the Air Station include military operations, training, maintenance and production, supply, medical administration, troop and family housing, community support, recreation, and utilities. Land use in OU1, including Site 16, is industrial. It is assumed that future use of Site 16 will remain the same. Since the land use is industrial and portions of the site are located in a wetland area, future residential use is considered unlikely.

2.3.2 Identification of Exposure Pathways

An exposure pathway can be described as the physical course that a COPC takes from the point of release to a receptor. To be complete, an exposure pathway must have all of the following components:

- A source (e.g., constituent residues in soil);
- A mechanism for chemical release and migration (e.g., leaching);
- An environmental transport medium (e.g., air);
- A point or site of potential human contact (exposure point, e.g., site soil); and
- A route of intake (e.g., incidental ingestion soil).

In the absence of any one of these components, an exposure pathway is considered incomplete and, by definition, there is no risk or hazard. In some cases, a receptor may contact a source directly, eliminating the release and transport pathways.

Potential current receptors include industrial workers (i.e., military and civilian personnel), maintenance workers, and trespassers/visitors (adult, youth, and child). The current receptors may come in contact with soil. Exposure routes may include incidental ingestion of the soil, dermal contact with the soil, and inhalation of particulate emissions from the soil. The COPCs identified for soil include metals, PCBs, pesticides and PAHs; therefore, volatile emissions from soil are not expected to contribute significantly to any potential risks to the receptors.

Potential future receptors include the current receptors and future construction workers. Although there are no plans for future residential use of the site, a future hypothetical residential scenario was evaluated. It was assumed that the future receptors could be exposed to surface and subsurface soil if future industrial buildings are constructed at the site, or excavation activities occur on site and the soil is re-worked, bringing the subsurface soil to the surface. Exposure routes for the future soil exposure scenarios are the same as those for current soil exposure scenarios - incidental ingestion of the soil and dermal contact with the soil.

In summary, the current and future land use exposure routes for quantitative evaluation include following:

- **Industrial Worker**—Incidental ingestion of and dermal contact with soil, and inhalation of particulate emissions from soil.
- **Maintenance Worker**—Incidental ingestion of and dermal contact with soil, and inhalation of particulate emissions from soil.
- **Trespasser/Visitor (adult, adolescent, and child)**—Incidental ingestion of and dermal contact with soil, and inhalation of particulate emissions from soil.
- **Construction Worker**—Incidental ingestion of and dermal contact with soil, and inhalation of particulate emissions from soil.
- **Hypothetical Resident (adult and child)** —Incidental ingestion of and dermal contact with soil, and inhalation of particulate emissions from soil.

2.3.3 Quantification of Exposure

Exposure is quantified by estimating the exposure point concentrations (EPCs) of COPCs in environmental media and COPC intake by the receptor.

Exposure Concentrations

EPCs are estimated constituent concentrations that a receptor may contact and are specific to each exposure medium. EPCs may be directly measured or estimated using environmental fate and transport models. Constituent concentrations in soil were measured for this assessment. Fate and transport modeling conducted for the Site 16 risk assessment included estimating fugitive dust emissions from soil following the methods in USEPA's Soil Screening Guidance Document (USEPA, 2002a), as shown in **Table 2.3 Attachment 1**.

ProUCL software Version 4.00.05 (USEPA, 2010b) was used to determine the distribution that the data fit and to calculate the 95 percent UCLs for the soil. ProUCL identifies three possible data distributions: normal distribution, log-normal distribution, and gamma distribution. The UCL calculation method is then selected based on the data distribution (that is, normal, lognormal, gamma, or nonparametric if the data do not fit any of the distributions). The recommendations outlined in the ProUCL software documentation were followed to select the appropriate UCL (USEPA, 2010b). The maximum detected concentration was used as the EPC in cases where the estimated 95 percent UCL was greater than the maximum detected concentration.

Attachment 1, Tables 3.1.RME through 3.2.RME and 3.1.CTE present the EPCs for the COPCs and the rationale for the selected EPC.

Estimation of Chemical Intakes

Chemical intake is the amount of the chemical entering the receptor's body. The quantification of exposure is based on an estimate of the average daily intake, the average amount of the chemical contaminant entering the receptor's body per day. Chemical intakes for the ingestion and dermal pathways are generally expressed as follows:

$$ADI = \frac{C \times CR \times EF \times ED}{BW \times AT}$$

Where:

ADI = average daily intake (mg/kg-day)

C = chemical concentration (mg/kg)

CR = contact rate (mg/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)

BW = body weight (kg)

AT = averaging time (days)

For the dermal pathway, the contact rate incorporates the skin surface area in contact with the exposure medium (soil), an absorption factor, and the soil to skin adherence factor (AF). The intake equation for the dermal exposure pathway is shown in Attachment 1, Table 4.1 (RME and CTE) and Table 4.2.RME. The absorption fractions used are from USEPA's RAGS Part E (USEPA 2004): pesticides (used default for SVOCs) - 0.1; PCBs - 0.14, PAHs - 0.13; arsenic -0.03; and other metals - 0.01. The AFs were obtained from USEPA RAGS Part E (USEPA, 2004) and are included in **Tables 4.1.RME, 4.2.RME, and 4.1.CTE** in **Attachment 1**.

Chemical exposure estimates for the inhalation pathway are generally expressed as follows:

$$EC = \frac{Ca \times ET \times EF \times ED \times CF}{AT}$$

Where:

EC = exposure concentration (mg/m³)

Ca = chemical concentration in air (mg/m³)

ET = exposure time (hours/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)
CF = conversion factor (day/24 hours)
AT = averaging time (days)

The intake equation requires exposure parameters that are specific to each exposure pathway and receptor. Many of the exposure parameters have default values, which were used for this assessment. These assumptions, based on estimates of body weights, media intake levels, and exposure frequencies and duration, are provided in USEPA guidance. Both Reasonable Maximum Exposure (RME) and Central Tendency Exposure (CTE) exposure parameters were compiled. CTE risks were only calculated for scenarios where the RME risk was greater than USEPA's non-carcinogenic hazard or carcinogenic risk target levels (non-carcinogenic hazard greater than 1 or carcinogenic risk greater than 10^{-4}). **Tables 4.1.RME through 4.4.RME, and 4.1.CTE** in **Attachment 1** identify the exposure parameters and intake equations for each of the scenarios evaluated in the risk assessment.

2.4 Toxicity Assessment

Toxicity assessment defines the relationship between the magnitude of exposure and possible severity of adverse effects, and weighs the quality of available toxicological evidence. Toxicity assessment generally consists of two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining the potential adverse effects from exposure to the constituent along with the type of health effect involved. Dose-response assessment is the process of quantitatively evaluating the toxicity information and characterizing the relationship between the dose of the constituent administered or received and the incidence of adverse health effects in the exposed population. Toxicity criteria (e.g., reference doses and slope factors) are derived from the dose-response relationship.

The USEPA recommends that a tiered approach be used to obtain the toxicity values, the reference doses (RfDs), reference concentrations (RfCs), cancer slope factors (CSFs), and inhalation unit risk factors (IURs) used to calculate non-cancer and cancer risks (USEPA, 2003). The sources of toxicity values are as follows:

- USEPA's Integrated Risk Information System (IRIS) database (USEPA, 2011)
- Provisional Peer Reviewed Toxicity Value (PPRTV) database maintained by the USEPA's National Center for Environmental Assessment (NCEA) and the Superfund Health Risk Technical Support Center (STSC)
- Other USEPA and non-USEPA sources including NCEA, Agency for Toxic Substances and Disease Registry, Health Effects Assessment Summary Tables (USEPA, 1997a), California EPA (Cal EPA), USEPA's Office of Water, and World Health Organization (WHO)

The use of provisional toxicity values, such as those from the PPRTV database, increases the uncertainty of the quantitative risk estimate.

USEPA-derived oral chronic and subchronic RfDs, inhalation chronic and subchronic RfCs, and associated uncertainty factors (UFs) and modifying factors (MFs) for the COPCs are

listed in **Tables 5.1** and **5.2** in **Attachment 1**. USEPA-derived oral CSFs and inhalation IURs are listed in **Tables 6.1** and **6.2** in **Attachment 1**.

Dermal RfDs and CSFs were calculated from the oral RfDs and CSFs using an oral to dermal adjustment factor. This factor is designed to adjust the orally-administered dose toxicity factors to dermally absorbed dose toxicity factors (USEPA, 2004). The oral RfDs were adjusted to dermal RfDs by multiplying by the oral to dermal adjustment factor (gastrointestinal absorption factor) and the oral CSFs were adjusted to dermal CSFs by dividing by the gastrointestinal (GI) absorption factor. If a chemical-specific GI absorption factor was not available or was greater than 50 percent, a GI absorption factor of 100 percent was assumed. The dermal RfDs are included in **Attachment 1, Table 5.1**. The dermal CSFs are presented in **Attachment 1, Table 6.1**.

USEPA (1989) defines the chronic RfD (and RfC) as an estimate of a daily exposure to the human population, including sensitive subpopulations, which is likely to be without appreciable risk of deleterious effects during a lifetime. Chronic RfDs are developed to be protective for long-term exposure to a compound (7 years to a lifetime). Chronic RfDs may be overly protective if used to evaluate the potential for adverse health effects resulting from short-term exposure. NCEA develops subchronic RfDs for short-term exposure (2 weeks to 7 years). Subchronic RfDs (and RfCs) have been peer-reviewed by USEPA and outside reviewers, but they have not undergone verification by an intra-USEPA workgroup, and as a result, are considered interim rather than verified toxicity values. Subchronic RfDs were used to evaluate the noncarcinogenic risks to the construction worker. If a subchronic RfD was not available, the chronic RfD was used. If a subchronic value was lower than a chronic value that has been developed subsequent to the subchronic value, the chronic value was used. Chronic RfDs were used for all other receptors.

Most of the constituents detected at Site 16 have toxicity factors and USEPA RSLs. Lead, which was retained as a COPC for soil, does not have available published toxicity factors. Lead is regulated by EPA based on blood-lead uptake using a physiologically based pharmakokinetic model called the Integrated Exposure Uptake Biokinetic (IEUBK) Model. The maximum concentration of lead of 708 mg/kg exceeds the residential screening level of 400 mg/kg in soil sample but is below the industrial screening level of 800 mg/kg. The exposure point concentration calculated for lead is 53 mg/kg, which is well below the residential screening level.

Approach for Potential Mutagenic Effects

Consistent with the Cancer Guidelines and Supplemental Guidance (USEPA, 2005a and 2005b) for COPCs which act via a mutagenic mode of action (MMOA), cancer risks for residential exposures were estimated using age-dependent adjustment factors (ADAFs). Chromium and carcinogenic PAHs were the only COPCs that are categorized as chemicals with a MMOA. The calculation of cancer risk using ADAFs is presented in Tables 7.9.RME Supplement A and 7.2 CTE Supplement B. As chemical-specific data are not available for the carcinogenic PAHs or chromium, default ADAFs, as included in the USEPA Region 3 Memorandum *Derivation of RBCs for Carcinogens that Act Via a Mutagenic Mode of Action and Incorporate Default ADAFs* (USEPA, 2006), were used for the MMOA evaluation.

Additionally, the exposure factors for the 0-2 year old child and 2-6 year old child were assumed to be the same as the 0-6 year old parameters, with the exception of the exposure duration, which was instead 2 years and 4 years, respectively. The exposure factors for

adult residential receptor were used for the 6-16 year old and the 16-30 year old, with the exception of the exposure durations, which were 10 years and 14 years, respectively.

2.5 Risks Characterization

Potential human health risks are discussed independently for carcinogenic and noncarcinogenic constituents because of the different toxicological endpoints, relevant exposure duration, and methods used to characterize risk. Some constituents may produce both noncarcinogenic and carcinogenic effects, and were evaluated in both groups. The methodology used to estimate noncarcinogenic hazards and carcinogenic risks are described below. Following the description of the methodology, the noncarcinogenic hazards and carcinogenic risks for Site 16 are discussed.

Noncarcinogenic health risks are estimated by comparing the calculated intake to an RfD (or RfC). The calculated intake divided by the RfD (or exposure concentration divided by the RfC) is equal to the hazard quotient (HQ):

$$HQ = \text{Intake} / \text{RfD} \text{ or } \text{Exposure Concentration} / \text{RfC}$$

The intake and RfD (or exposure concentration and RfC) represent the same exposure period (i.e., chronic or subchronic) and the same exposure route (i.e., oral intakes are divided by oral RfDs). A HQ that exceeds 1 (i.e., the intake exceeds the RfD) indicates that there is a potential for adverse health effects associated with exposure to that constituent.

To assess the potential for noncarcinogenic health effects posed by exposure to multiple constituents, a hazard index (HI) approach is used (USEPA, 1986). This approach assumes that noncarcinogenic hazards associated with exposure to more than one constituent are additive. Synergistic or antagonistic interactions between constituents are not considered. The HI may exceed 1 even if all of the individual HQs are less than one. HIs are also added across exposure routes and media to estimate the total noncarcinogenic health effects to a receptor posed by exposure through multiple routes and media. A HI greater than one indicates that there is some potential for adverse noncarcinogenic health effects associated with exposure to the contaminants of concern. However, if the HI is greater than one, it is possible to separate the HI by target organ/effect to determine if the HI for a specific target organ/effect is greater than one. If the HI for each target organ/effect is not above one, it can be assumed that there is no unacceptable noncarcinogenic hazard to the receptor.

The potential for carcinogenic effects due to exposure to site-related constituents is evaluated by estimating the excess lifetime carcinogenic risk (ELCR). ELCR is the incremental increase in the probability of developing cancer during one's lifetime in addition to the background probability of developing cancer. For example, an individual exposed to a carcinogen with a calculated cancer risk of 2×10^{-6} indicates that the probability of the individual getting cancer increases by 2 in a million above background levels.

Carcinogenic risk is calculated by multiplying the intake by the CSF (or exposure concentration by the IUR).

$$ELCR = \text{Intake} \times \text{CSF} \text{ or } \text{Exposure Concentration} \times \text{IUR}$$

The combined risk from exposure to multiple constituents was evaluated by adding the risks from individual constituents. Risks were also added across the exposure routes and media if an individual would be exposed through multiple routes and to multiple media.

When a cumulative carcinogenic risk to an individual receptor under the assumed RME exposure conditions at the site exceeds 100 in a million (i.e., 10^{-4} excess carcinogenic risk), CERCLA generally requires remedial action to reduce risks at the site (USEPA, 1991). If the cumulative risk is less than 10^{-4} , action generally is not required, but may be warranted if a risk-based chemical-specific standard is exceeded.

If the RME risks exceeded a Hazard Index (HI) of 1 or a carcinogenic risk of 1×10^{-4} , risks were calculated for Central Tendency Exposure (CTE) conditions.

For the hypothetical residential receptor, noncarcinogenic risks were calculated for the adult and child residents, while carcinogenic risks were calculated for lifetime residents. The USEPA assumes that the carcinogenic effect of chemicals is a cumulative process, thus making even short-term exposures to chemicals equivalent to lifetime exposures.

2.6 Risk Assessment Results

The results of the risk characterization are presented below by receptor. A summary of the RME results is shown in **Table 3**, and a summary of the CTE results shown in **Table 4**. The calculated risks are presented in **Attachment 1, Tables 7.1.RME through 7.9.RME, and Table 7.1.CTE**. The risks are summarized in **Attachment 1, Tables 9.1.RME through 9.9.RME, and Table 9.1.CTE through 9.2.CTE**. Tables 10.1.RME through 10.2.RME show the constituents that contributed HIs above 0.1 to total cumulative receptor HIs greater than 1.0 or carcinogenic risks greater than 10^{-6} to total cumulative receptor carcinogenic risks greater than 10^{-4} .

Current/Future Industrial Worker (Attachment 1, Table 9.1.RME)

The risk assessment assumed that a current/future industrial worker could be exposed to soil through incidental ingestion and dermal contact. The RME noncarcinogenic hazard (0.2) is below USEPA's target HI of 1. The RME carcinogenic risk (2×10^{-5}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4} .

Current/Future Maintenance Worker (Attachment 1, Table 9.2.RME)

The risk assessment assumed that a current/future maintenance worker could be exposed to soil through incidental ingestion and dermal contact. The RME noncarcinogenic hazard (0.05) is below USEPA's target HI of 1. The RME carcinogenic risk (4×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4} .

Current/Future Adult Trespasser/Visitor (Attachment 1, Table 9.3.RME)

The risk assessment assumed that a current/future adult trespasser/visitor could be exposed to soil through incidental ingestion and dermal contact. The RME noncarcinogenic hazard (0.04) is below USEPA's target HI of 1. The RME carcinogenic risk (4×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4} .

Current/Future Youth Trespasser/Visitor (Attachment 1, Table 9.4.RME)

The risk assessment assumed that a current/future youth trespasser/visitor could be exposed to soil through incidental ingestion and dermal contact. The RME noncarcinogenic

hazard (0.07) is below USEPA's target HI of 1. The RME carcinogenic risk (2×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4} .

Current/Future Child Trespasser/Visitor (Attachment 1, Table 9.5.RME)

The risk assessment assumed that a current/future child trespasser/visitor could be exposed to soil through incidental ingestion and dermal contact. The RME noncarcinogenic hazard (0.4) is below USEPA's target HI of 1. The RME carcinogenic risk (8×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4} .

Current/Future Construction Worker (Attachment 1, Table 9.6.RME)

The risk assessment assumed that a future construction worker could be exposed to soil through incidental ingestion and dermal. The RME noncarcinogenic hazard (0.7) does not exceed USEPA's target HI of 1. The RME carcinogenic risk (3×10^{-6}) is within USEPA's target risk range of 1×10^{-6} to 1×10^{-4} .

Hypothetical Future Adult Resident (Attachment 1, Table 9.7.RME)

The risk assessment assumed that a future adult resident could be exposed to soil through incidental ingestion and dermal contact. Carcinogenic risks were not calculated for an adult resident, but were calculated for a lifetime resident following USEPA guidance.

The total RME non-carcinogenic hazard associated with exposure to soil (HI = 0.3) does not exceed USEPA's target HI of 1.

Hypothetical Future Child Resident (Attachment 1, Table 9.8.RME, Table 9.1.CTE)

The risk assessment assumed that a future child resident could be exposed to soil through incidental ingestion and dermal contact. Carcinogenic risks were not calculated for a child resident, but were calculated for a lifetime resident following USEPA guidance.

The RME non-carcinogenic hazard associated with exposure to soil (HI = 3) exceeds the acceptable HI of 1. HIs for each target organ do not exceed the target threshold of 1; therefore, there is no unacceptable hazard to a child resident. The CTE non-carcinogenic hazard (HI = 0.4) is below USEPA's target HI of 1.

Hypothetical Future Lifetime Resident (Attachment 1, Table 9.9.RME, Table 9.2.CTE)

The risk assessment assumed that a lifetime resident could be exposed to soil through incidental ingestion and dermal contact. The RME carcinogenic risk associated with exposure to soil (2×10^{-4}) exceeds the upper end of USEPA's target risk range of 10^{-6} to 10^{-4} . Arsenic, chromium, and PAHs are the main contributors to the total risk. In order to provide a perspective on the total risk, additional calculations were performed to demonstrate potential risk from site-related levels of contaminants (levels of metals above background) and adjustments to the chromium toxicity factors.

Arsenic was detected above the Adjusted Residential and Industrial RSLs (0.39 milligrams per kilogram [mg/kg] and 1.6 mg/kg, respectively) at 12 locations. However, arsenic was detected up to a maximum concentration of 13.7 mg/kg in the MCAS Cherry Point background data set. Only two samples contained arsenic concentrations above the background range, with concentrations of 63.2 and 18.6 mg/kg. Arsenic is commonly found in soil and sediment derived from rocks of volcanic origin, adsorbed to metal oxides and clay mineral surfaces and associated with sulfide minerals and organic carbon. Therefore,

arsenic is likely associated with background conditions at Site 16. If the RME carcinogenic risk associated with exposure to soil is calculated without arsenic (assuming arsenic is associated with background), the potential risk would fall within the target risk range (1×10^{-4} , at the upper end of the range).

In addition, the RME carcinogenic risk is likely to be overestimated because the toxicity value for hexavalent chromium (the more toxic valence state of chromium) is used to evaluate total chromium in soil since the sample analyses did not have chromium broken out in its separate valence states. However, it is unlikely that a substantial portion of the chromium detected in soil is in the form of hexavalent chromium due to known past historical land use at Site 16. A reasonable estimation of the likely percentage of hexavalent chromium can be obtained from a recently completed background soil investigation at nearby Marine Corps Base Camp Lejeune (MCB CamLej), which is also located within the Atlantic Coastal Plain of North Carolina and has similar underlying geology. The MCB CamLej background study compared the ratios of hexavalent chromium to the more benign trivalent chromium in background soil samples and calculated background threshold values (BTVs) for both hexavalent and trivalent chromium in various soil types and locations (surface versus subsurface soil, undeveloped versus developed areas, and sand versus sand with fines). The BTV ratios for hexavalent to total (hexavalent plus trivalent) chromium ranged from 0.0991 to 0.3684 (depending on soil type and area) and averaged 0.1575. Using the highest (most conservative) ratio in the study, the maximum estimated percentage of hexavalent chromium would be approximately 37% and the average would be less than 1 in 6. If the RME carcinogenic risk associated with exposure to soil were calculated using a 1 to 6 ratio of hexavalent chromium to total chromium (which the MCB CamLej background soil study supports), it would fall within the target risk range (7×10^{-5}). It should also be noted that there is some uncertainty associated with the hexavalent chromium oral cancer slope factor used in the risk assessment, as the value is from the New Jersey EPA and has not been included in USEPA's Integrated Risk Information System (IRIS) database.

Since the RME carcinogenic risk (without adjustments for arsenic and chromium) exceeded a carcinogenic risk of 1×10^{-4} , risks were calculated for CTE conditions. The CTE carcinogenic risk associated with exposure to soil (1×10^{-4}) is at the upper end of the target risk range. The CTE risk would be lower (4×10^{-5}) if adjustments to arsenic and chromium, as discussed above for the RME evaluation, are considered.

3 Summary and Conclusions

Human health risks at Site 16 were evaluated for exposure to:

- Total soil for current/future industrial workers, maintenance workers, trespasser/visitors (adult, youth, and child), future construction workers, and future hypothetical residents (adult and child).

A summary of the risk results is provided in **Tables 3 and 4**. The future residential scenario is the only scenario with potentially unacceptable risks.

Potential future contact with surface and subsurface soil by future residents results in RME carcinogenic risks of 2×10^{-4} , which is above USEPA's acceptable risk range. The primary contributors to calculated risk are arsenic (35%), chromium (26%), and the carcinogenic

PAHs (38%) detected in the soil. Considering that arsenic concentrations at the site are within background levels and that it is likely that the actual percentage of hexavalent chromium is not 100 percent, but somewhere between 10 and 37 percent per the MCB CamLej soil background study, the potential RME carcinogenic risk would be within the target risk range.

Since the RME carcinogenic risk (without adjustments for arsenic and chromium) exceeded a carcinogenic risk of 1×10^{-4} , risks were calculated for CTE conditions. The CTE carcinogenic risk from exposure to all detected chemicals in soil equals 1×10^{-4} which is at the upper limit of USEPA's acceptable risk range. If adjusted for arsenic and chromium, the potential CTE risk would be 4×10^{-5} , which is within the target risk range.

The residential land use scenario evaluated in this assessment is very conservative, since it is likely that land use will not change. Site 16 is not currently residential, and future land use is anticipated to remain similar to current use.

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Attachment 2

Raw Analytical Data Tables

Table 1
Summary of Data Quantitatively Used in HHRA
Site 16, MCAS Cherry Point

| Medium | Date of Sampling | Sample | Parameters |
|-------------------|------------------|---------------------|--------------------------------|
| Total Soil | | | |
| | 9/21/2000 | 16SB02-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 9/1/1995 | CP63-CS-001 | Lead |
| | 9/1/1995 | CP63-CS-002 | Lead |
| | 9/1/1995 | CP63-CS-003 | Lead |
| | 9/1/1995 | CP63-CS-010 | Lead |
| | 9/1/1995 | CP63-CS-014 | Lead |
| | 9/1/1995 | CP63-CS-015 | Lead |
| | 9/1/1995 | CP63-CS-016 | Lead |
| | 9/1/1995 | CP63-CS-017 | Lead |
| | 9/1/1995 | CP63-CS-018 | Lead |
| | 9/1/1995 | CP63-CS-019 | Lead |
| | 9/1/1995 | CP63-CS-026 | Lead |
| | 9/1/1995 | CP63-CS-027 | Lead |
| | 9/1/1995 | CP63-CS-028 | Lead |
| | 9/1/1995 | CP63-CS-007 | Lead |
| | 9/1/1995 | CP63-CS-008 | Lead |
| | 9/1/1995 | CP63-CS-009 | Lead |
| | 8/1/1995 | SO01-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO02-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO03-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SB04-0102 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO04-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO05-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO06-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO07-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO08-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO09-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO10-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SB17-0102 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO17-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SB18-0102 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO18-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SB19-0102 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 8/1/1995 | SO19-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 10/30/1994 | OU1-SO-SS1-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-100-04B | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-101-04B | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-102-04B | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-103-04B | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-104-04B | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-105-04B | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-106-04B | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-106P-04B (1) | SVOCs, Pest/PCBs, Metals |
| | 5/19/2004 | OU1-SS-107-04B | SVOCs, Pest/PCBs, Metals |
| | 10/30/1994 | OU1-SO-SS2-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 10/30/1994 | OU1-SO-SS3-0001 | VOCs, SVOCs, Pest/PCBs, Metals |
| | 10/30/1994 | OU1-SO-SS4-0001 | VOCs, SVOCs, Pest/PCBs, Metals |

Notes:

¹ Duplicate sample

Table 2
Summary of Chemicals of Potential Concern for the Risk Assessment
Site 16, MCAS Cherry Point

| Total Soil |
|------------------------|
| Benzo(a)anthracene |
| Benzo(a)pyrene |
| Benzo(b)fluoranthene |
| Benzo(k)fluoranthene |
| Chrysene |
| Dibenz(a,h)anthracene |
| Indeno(1,2,3-cd)pyrene |
| Aroclor-1254 |
| Aroclor-1260 |
| Dieldrin |
| Aluminum |
| Antimony |
| Arsenic |
| Barium |
| Cadmium |
| Chromium* |
| Cobalt |
| Copper |
| Iron |
| Lead |
| Manganese |
| Mercury |
| Thallium |
| Vanadium |
| Zinc |

Note

*Chromium is also a COPC for the soil to air pathway

Table 3
Summary of RME Cancer Risks and Hazard Indices
Site 16, MCAS Cherry Point

| Receptor | Media | Exposure Route | Cancer Risk | Chemicals with Cancer Risks >10 ⁻⁴ | Chemicals with Cancer Risks >10 ⁻⁵ and ≤10 ⁻⁴ | Chemicals with Cancer Risks >10 ⁻⁶ and ≤10 ⁻⁵ | Hazard Index | Chemicals with HI>1 |
|------------------------------------|------------|----------------|-------------|---|---|--|--------------|---------------------|
| Current/Future Industrial Worker | Total Soil | Ingestion | 2E-05 | | Arsenic | Chromium | 0.2 | |
| | | Dermal Contact | 3E-06 | | | Arsenic | 0.08 | |
| | | Inhalation | 1E-07 | | | | 0.00004 | |
| | | Total | 2E-05 | | Arsenic | Benzo(a)pyrene, Chromium | 0.2 | |
| Current/Future Maintenance Worker | Total Soil | Ingestion | 3E-06 | | | Arsenic | 0.03 | |
| | | Dermal Contact | 7E-07 | | | | 0.02 | |
| | | Inhalation | 3E-08 | | | | 0.000009 | |
| | | Total | 4E-06 | | | Arsenic | 0.05 | |
| Current/Future Trespasser (Adult) | Total Soil | Ingestion | 3E-06 | | | Arsenic | 0.03 | |
| | | Dermal Contact | 4E-07 | | | | 0.01 | |
| | | Inhalation | 6E-09 | | | | 0.000009 | |
| | | Total | 4E-06 | | | Arsenic | 0.04 | |
| Current/Future Trespasser (Youth) | Total Soil | Ingestion | 2E-06 | | | Arsenic | 0.05 | |
| | | Dermal Contact | 3E-07 | | | | 0.02 | |
| | | Inhalation | 3E-09 | | | | 0.000009 | |
| | | Total | 2E-06 | | | Arsenic | 0.07 | |
| Current/Future Trespasser (Child) | Total Soil | Ingestion | 8E-06 | | | Arsenic, Chromium | 0.3 | |
| | | Dermal Contact | 6E-07 | | | | 0.07 | |
| | | Inhalation | 2E-09 | | | | 0.000009 | |
| | | Total | 8E-06 | | | Arsenic, Chromium | 0.4 | |
| Current/Future Construction Worker | Total Soil | Ingestion | 3E-06 | | | Arsenic | 0.6 | |
| | | Dermal Contact | 1E-07 | | | | 0.04 | |
| | | Inhalation | 5E-09 | | | | 0.00004 | |
| | | Total | 3E-06 | | | Arsenic | 0.7 | |
| Future Resident (Adult) | Total Soil | Ingestion | NA | | | | 0.2 | |
| | | Dermal Contact | NA | | | | 0.07 | |
| | | Inhalation | NA | | | | 0.0001 | |
| | | Total | NA | | | | 0.3 | |
| Future Resident (Child) | Total Soil | Ingestion | NA | | | | 2 | |
| | | Dermal Contact | NA | | | | 0.5 | |
| | | Inhalation | NA | | | | 0.0002 | |
| | | Total | NA | | | | 3 | |
| Future Resident (Child/Adult) | Total Soil | Ingestion | 1E-04 | | Arsenic, Chromium, Benzo(a)pyrene | Benzo(b)fluoranthene, Dibenz(a,h)anthracene | NA | |
| | | Dermal Contact | 5E-05 | | Benzo(a)pyrene | Arsenic, Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene | NA | |
| | | Inhalation | 6E-08 | | | | NA | |
| | | Total | 2E-04 | | Arsenic, Chromium, Benzo(a)pyrene | Benzo(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene | NA | |

NA = Not available/not applicable

Table 4
Summary of CTE Cancer Risks and Hazard Indices
Site 16, MCAS Cherry Point

| Receptor | Media | Exposure Route | Cancer Risk | Chemicals with Cancer Risks $>10^{-4}$ | Chemicals with Cancer Risks $>10^{-5}$ and $\leq 10^{-4}$ | Chemicals with Cancer Risks $>10^{-6}$ and $\leq 10^{-5}$ | Hazard Index | Chemicals with HI>1 |
|--------------------------------|--------------|-----------------------|--------------------|---|---|---|---------------------|-------------------------------|
| Future Resident (Child) | Total Soil | Ingestion | NA | | | | 0.3 | |
| | | Dermal Contact | NA | | | | 0.03 | |
| | | Inhalation | NA | | | | 0.0001 | |
| | | Total | NA | | | | 0.4 | |
| Future Resident Adult/Child | Total Soil | Ingestion | 7E-05 | | | | NA | |
| | | Dermal Contact | 3E-05 | | | | NA | |
| | | Inhalation | 4E-08 | | | | NA | |
| | | Total | 1E-04 | | | | NA | |

NA = Not available/not applicable

Attachment 1

HHRA RAGS Part D Tables

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
Site 16, MCAS Cherry Point

| Scenario Timeframe | Medium | Exposure Medium | Exposure Point | Receptor Population | Receptor Age | Exposure Route | On-Site/Off-Site | Type of Analysis | Rationale for Selection or Exclusion of Exposure Pathway |
|--------------------|--------|-----------------------------|---------------------|---------------------|--------------|----------------|------------------|---|---|
| Current/Future | Soil | Soil | Site 16 | Industrial Worker | Adult | Ingestion | On-site | Quant | Industrial workers may contact soil while working at the site. |
| | | | | | | Dermal | On-site | Quant | Industrial workers may contact soil while working at the site. |
| | | | | Maintenance Worker | Adult | Ingestion | On-site | Quant | Maintenance workers may contact soil while working at the site. |
| | | | | | | Dermal | On-site | Quant | Maintenance workers may contact soil while working at the site. |
| | | | | Trespasser/Visitor | Adult | Ingestion | On-site | Quant | Trespassers/visitors may contact soil at the site. |
| | | | | | | Dermal | On-site | Quant | Trespassers/visitors may contact soil at the site. |
| | | | | | Youth | Ingestion | On-site | Quant | Trespassers/visitors may contact soil at the site. |
| | | | | | | Dermal | On-site | Quant | Trespassers/visitors may contact soil at the site. |
| | | | | Child | Adult | Ingestion | On-site | Quant | Trespassers/visitors may contact soil at the site. |
| | | | | | | Dermal | On-site | Quant | Trespassers/visitors may contact soil at the site. |
| | Air | Emissions from Site 16 Soil | Industrial Worker | Adult | Inhalation | On-site | Quant | Industrial workers may inhale emissions from soil while working at the site. | |
| | | | | | Inhalation | On-site | Quant | Maintenance workers may inhale emissions from soil while working at the site. | |
| | | | Maintenance Worker | Adult | Inhalation | On-site | Quant | Trespassers/visitors may inhale emissions from soil while visiting the site. | |
| | | | | | Inhalation | On-site | Quant | Trespassers/visitors may inhale emissions from soil while visiting the site. | |
| | | | | | Child | Inhalation | On-site | Quant | Trespassers/visitors may inhale emissions from soil while visiting the site. |
| Future | Soil | Soil | Construction Worker | Adult | Ingestion | On-site | Quant | Construction workers could contact soil while performing construction. | |
| | | | | | Dermal | On-site | Quant | Construction workers could contact soil while performing construction. | |
| | | | Resident | Adult | Dermal | On-site | Quant | Although unlikely, if the site is used for future residential development, residents may contact soil. | |
| | | | | | Ingestion | On-site | Quant | Although unlikely, if the site is used for future residential development, residents may contact soil. | |
| | | | Child | Adult | Dermal | On-site | Quant | Although unlikely, if the site is used for future residential development, residents may contact soil. | |
| | | | | | Ingestion | On-site | Quant | Although unlikely, if the site is used for future residential development, residents may contact soil. | |
| | Air | Emissions from Site 16 Soil | Construction Worker | Adult | Inhalation | On-site | Quant | Construction workers may inhale emissions from soil while performing construction activities. | |
| | | | Resident | Adult | Inhalation | On-site | Quant | If the site is used for future residential development, residents may inhale emissions from soil that are mixed during future activities at the site. | |
| | | | | | Child | Inhalation | On-site | Quant | If the site is used for future residential development, residents may inhale emissions from soil that are mixed during future activities at the site. |

Table 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Point | CAS Number | Chemical | Minimum [1] Concentration Qualifier | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Detection Frequency | Range of Detection Limits | Concentration Used for Screening [2] | Background Value | Screening [4] Toxicity Value | Potential ARAR/TBC Value | Potential ARAR/TBC Source | COPC Flag | Rationale for Contaminant Deletion or Selection [5] |
|----------------|-------------|----------------------------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|------------------------------|--------------------------|---------------------------|-----------|---|
| Total Soil | 78-93-3 | 2-Butanone | 0.008 J | 0.008 J | MG/KG | SB17-0102 | 1/22 | 0.011 - 0.028 | 0.008 | NA | 280 N | NA | NA | NO | BSL |
| | 67-64-1 | Acetone | 0.006 J | 0.089 | MG/KG | SO01-0001 | 7/22 | 0.011 - 0.028 | 0.089 | NA | 610 N | NA | NA | NO | BSL |
| | 71-43-2 | Benzene | 0.011 J | 0.011 J | MG/KG | SO10-0001 | 1/22 | 0.011 - 0.028 | 0.011 | NA | 1.1 C* | NA | NA | NO | BSL |
| | 75-09-2 | Methylene chloride | 1.00E-03 J | 0.061 | MG/KG | SO05-0001 | 16/22 | 0.011 - 0.018 | 0.061 | NA | 11 C | NA | NA | NO | BSL |
| | 108-88-3 | Toluene | 0.002 J | 0.015 J | MG/KG | SO10-0001 | 7/22 | 0.011 - 0.028 | 0.015 | NA | 50 NS | NA | NA | NO | BSL |
| | 91-57-6 | 2-Methylnaphthalene | 0.04 J | 0.2 J | MG/KG | OU1-SS-105-04B | 12/30 | 0.36 - 0.94 | 0.2 | NA | 3.1 N | NA | NA | NO | BSL |
| | 83-32-9 | Acenaphthene | 0.029 J | 0.053 J | MG/KG | OU1-SS-101-04B | 2/30 | 0.36 - 0.94 | 0.053 | NA | 34 N | NA | NA | NO | BSL |
| | 120-12-7 | Anthracene | 0.022 J | 0.078 J | MG/KG | OU1-SO-SS1-0001 | 5/30 | 0.36 - 0.94 | 0.078 | NA | 170 N | NA | NA | NO | BSL |
| | 56-55-3 | Benzo(a)anthracene | 0.034 J | 0.45 J | MG/KG | OU1-SS-101-04B | 18/30 | 0.36 - 0.94 | 0.45 | NA | 0.15 C | NA | NA | YES | ASL |
| | 50-32-8 | Benzo(a)pyrene | 0.03 J | 1.1 J | MG/KG | OU1-SS-101-04B | 19/30 | 0.36 - 0.61 | 1.1 | NA | 0.015 C | NA | NA | YES | ASL |
| | 205-99-2 | Benzo(b)fluoranthene | 0.023 J | 2.4 J | MG/KG | OU1-SS-101-04B | 21/30 | 0.36 - 0.93 | 2.4 | NA | 0.15 C | NA | NA | YES | ASL |
| | 191-24-2 | Benzo(g,h,i)perylene | 0.041 J | 2.7 J | MG/KG | OU1-SS-101-04B | 17/30 | 0.36 - 0.94 | 2.7 | NA | 17 N | NA | NA | NO | BSL |
| | 207-08-9 | Benzo(k)fluoranthene | 0.035 J | 2.1 J | MG/KG | OU1-SS-101-04B | 15/30 | 0.36 - 0.75 | 2.1 | NA | 1.5 C | NA | NA | YES | ASL |
| | 117-81-7 | bis(2-Ethylhexyl)phthalate | 0.042 J | 3.6 J | MG/KG | OU1-SS-101-04B | 18/30 | 0.36 - 0.94 | 3.6 | NA | 35 C* | NA | NA | NO | BSL |
| | 85-68-7 | Butylbenzylphthalate | 0.61 J | 0.61 J | MG/KG | OU1-SO-SS4-0001 | 1/29 | 0.36 - 0.75 | 0.61 | NA | 260 C* | NA | NA | NO | BSL |
| | 86-74-8 | Carbazole | 0.028 J | 0.087 J | MG/KG | OU1-SS-101-04B | 2/30 | 0.36 - 0.94 | 0.087 | NA | 150 N | NA | NA | NO | BSL |
| | 218-01-9 | Chrysene | 0.023 J | 1.3 J | MG/KG | OU1-SS-101-04B | 21/30 | 0.36 - 0.61 | 1.3 | NA | 15 C | NA | NA | YES | cPAH |
| | 53-70-3 | Dibenz(a,h)anthracene | 0.034 J | 0.056 J | MG/KG | SO08-0001 | 6/29 | 0.36 - 0.94 | 0.056 | NA | 0.015 C | NA | NA | YES | ASL |
| | 132-64-9 | Dibenzofuran | 0.04 J | 0.059 J | MG/KG | OU1-SS-105-04B | 3/30 | 0.36 - 0.94 | 0.059 | NA | 0.78 N | NA | NA | NO | BSL |
| | 84-66-2 | Diethylphthalate | 0.022 J | 0.022 J | MG/KG | SO18-0001 | 1/30 | 0.36 - 0.94 | 0.022 | NA | 490 N | NA | NA | NO | BSL |
| | 84-74-2 | Di-n-butylphthalate | 0.022 J | 0.29 J | MG/KG | SO06-0001 | 9/30 | 0.36 - 0.94 | 0.29 | NA | 61 N | NA | NA | NO | BSL |
| | 206-44-0 | Fluoranthene | 0.023 J | 0.79 J | MG/KG | OU1-SS-101-04B | 20/30 | 0.36 - 0.61 | 0.79 | NA | 23 N | NA | NA | NO | BSL |
| | 193-39-5 | Indeno(1,2,3-cd)pyrene | 0.039 J | 0.17 J | MG/KG | SO08-0001 | 16/29 | 0.36 - 0.94 | 0.17 | NA | 0.15 C | NA | NA | YES | ASL |
| | 91-20-3 | Naphthalene | 0.024 J | 0.11 J | MG/KG | OU1-SS-105-04B | 9/30 | 0.36 - 0.94 | 0.11 | NA | 3.6 C* | NA | NA | NO | BSL |
| | 85-01-8 | Phenanthrene | 0.032 J | 0.41 J | MG/KG | OU1-SS-101-04B | 16/30 | 0.36 - 0.94 | 0.41 | NA | 170 N | NA | NA | NO | BSL |
| | 129-00-0 | Pyrene | 0.022 J | 0.87 J | MG/KG | OU1-SO-SS1-0001 | 20/30 | 0.36 - 0.61 | 0.87 | NA | 17 N | NA | NA | NO | BSL |
| | 72-54-8 | 4,4'-DDD | 0.0024 J | 0.039 | MG/KG | SB19-0102 | 8/30 | 0.0036 - 0.019 | 0.039 | NA | 2 C | NA | NA | NO | BSL |
| | 72-55-9 | 4,4'-DDE | 0.0015 J | 0.032 | MG/KG | SO17-0001 | 13/30 | 0.0036 - 0.0078 | 0.032 | NA | 1.4 C | NA | NA | NO | BSL |
| | 50-29-3 | 4,4'-DDT | 0.0054 | 0.19 J | MG/KG | OU1-SS-101-04B | 16/30 | 0.0036 - 0.047 | 0.19 | NA | 1.7 C* | NA | NA | NO | BSL |
| | 319-84-6 | alpha-BHC | 0.0045 | 0.0045 | MG/KG | OU1-SS-104-04B | 1/30 | 0.0018 - 0.0097 | 0.0045 | NA | 0.077 C | NA | NA | NO | BSL |
| | 5103-71-9 | alpha-Chlordane | 0.0026 | 0.029 J | MG/KG | OU1-SO-SS2-0001 | 9/30 | 0.0018 - 0.0097 | 0.029 | NA | 1.6 C* | NA | NA | NO | BSL |
| | 11097-69-1 | Aroclor-1254 | 0.086 | 0.34 | MG/KG | SO08-0001 | 6/30 | 0.036 - 0.19 | 0.34 | NA | 0.11 C** | NA | NA | YES | ASL |
| | 11096-82-5 | Aroclor-1260 | 0.022 J | 0.49 | MG/KG | SO08-0001 | 11/30 | 0.036 - 0.19 | 0.49 | NA | 0.22 C | NA | NA | YES | ASL |
| | CHLORDANE B | beta-Chlordane | 0.0023 | 0.026 | MG/KG | OU1-SO-SS2-0001 | 9/22 | 0.0019 - 0.0097 | 0.026 | NA | 1.6 C* | NA | NA | NO | BSL |

Table 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Point | CAS Number | Chemical | Minimum [1] Concentration Qualifier | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Detection Frequency | Range of Detection Limits | Concentration Used for Screening [2] | Background Value | Screening [4] Toxicity Value | Potential ARAR/TBC Value | Potential ARAR/TBC Source | COPC Flag | Rationale for Contaminant Deletion or Selection [5] |
|----------------|------------|--------------------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|------------------------------|--------------------------|---------------------------|-----------|---|
| | 60-57-1 | Dieldrin | 0.0017 J | 0.11 | MG/KG | OU1-SS-101-04B | 10/30 | 0.0036 - 0.047 | 0.11 | NA | 0.03 C | NA | NA | YES | ASL |
| | 72-20-8 | Endrin | 0.011 | 0.014 | MG/KG | SO01-0001 | 3/30 | 0.0036 - 0.019 | 0.014 | NA | 0.18 N | NA | NA | NO | BSL |
| | 7421-93-4 | Endrin aldehyde | 0.0032 J | 0.032 J | MG/KG | OU1-SS-101-04B | 6/30 | 0.0036 - 0.019 | 0.032 | NA | 0.18 N | NA | NA | NO | BSL |
| | 53494-70-5 | Endrin ketone | 0.0057 | 0.0057 | MG/KG | SO01-0001 | 1/30 | 0.0036 - 0.019 | 0.0057 | NA | 0.18 N | NA | NA | NO | BSL |
| | 5103-74-2 | gamma-Chlordane | 0.013 J | 0.013 J | MG/KG | OU1-SS-101-04B | 1/8 | 0.0018 - 0.0026 | 0.013 | NA | 1.6 C* | NA | NA | NO | BSL |
| | 76-44-8 | Heptachlor | 0.0026 | 0.0026 | MG/KG | SO01-0001 | 1/30 | 0.0018 - 0.0097 | 0.0026 | NA | 0.11 C | NA | NA | NO | BSL |
| | 1024-57-3 | Heptachlor epoxide | 0.003 | 0.003 | MG/KG | SO09-0001 | 1/30 | 0.0018 - 0.0097 | 0.003 | NA | 0.053 C* | NA | NA | NO | BSL |
| | 7429-90-5 | Aluminum | 2,450 | 35,800 | MG/KG | OU1-SO-SS2-0001 | 29/29 | 31.8 - 47.5 | 35800 | 10160 | 770 N | NA | NA | YES | ASL |
| | 7440-36-0 | Antimony | 0.98 | 14.5 | MG/KG | SB04-0102 | 6/29 | 0.45 - 14.2 | 14.5 | NA | 0.31 N | NA | NA | YES | ASL |
| | 7440-38-2 | Arsenic | 0.58 J | 70.9 J | MG/KG | OU1-SO-SS1-0001 | 25/29 | 1.5 - 2.4 | 70.9 | 3.902 | 0.39 C* | NA | NA | YES | ASL |
| | 7440-39-3 | Barium | 8.3 | 816 | MG/KG | OU1-SS-101-04B | 29/29 | 31.8 - 47.5 | 816 | 22.99 | 150 N | NA | NA | YES | ASL |
| | 7440-41-7 | Beryllium | 0.056 J | 1.4 | MG/KG | OU1-SO-SS1-0001 | 16/29 | 0.18 - 1.2 | 1.4 | NA | 1.6 N | NA | NA | NO | BSL |
| | 7440-42-8 | Boron | 1.1 | 40.5 | MG/KG | OU1-SS-101-04B | 19/24 | 2.4 - 3.6 | 40.5 | NA | 160 N | NA | NA | NO | BSL |
| | 7440-43-9 | Cadmium | 0.061 J | 24.5 | MG/KG | SO05-0001 | 19/29 | 0.25 - 2.8 | 24.5 | 1.128 | 0.7 N | NA | NA | YES | ASL |
| | 7440-70-2 | Calcium | 738 J | 38,400 J | MG/KG | OU1-SO-SS3-0001 | 29/29 | 794 - 1190 | 38400 | 511.3 | NA | NA | NA | NO | NUT |
| | 7440-47-3 | Chromium | 3.7 J | 87.7 | MG/KG | SO07-0001 | 29/29 | 1.6 - 2.4 | 87.7 | 16.96 | 0.29 C | NA | NA | YES | ASL |
| | 7440-48-4 | Cobalt | 0.2 J | 5.7 | MG/KG | SO07-0001 | 25/29 | 0.87 - 11.9 | 5.7 | 2.383 | 0.23 N | NA | NA | YES | ASL |
| | 7440-50-8 | Copper | 0.86 J | 156 | MG/KG | SB04-0102 | 29/29 | 4 - 5.9 | 156 | 3.76 | 31 N | NA | NA | YES | ASL |
| | 7439-89-6 | Iron | 2,000 | 23,600 | MG/KG | OU1-SO-SS1-0001 | 29/29 | 15.9 - 23.7 | 23600 | 5959 | 550 N | NA | NA | YES | ASL |
| | 7439-92-1 | Lead | 2.8 J | 708 | MG/KG | SB04-0102 | 45/45 | 0.48 - 0.71 | 708 | 10.52 | 40 N | NA | NA | YES | ASL |
| | 7439-95-4 | Magnesium | 275 | 3,960 | MG/KG | OU1-SO-SS4-0001 | 29/29 | 794 - 1190 | 3960 | 421.7 | NA | NA | NA | NO | NUT |
| | 7439-96-5 | Manganese | 10.4 | 393 | MG/KG | OU1-SO-SS4-0001 | 29/29 | 2.4 - 3.6 | 393 | 16.72 | 18 N | NA | NA | YES | ASL |
| | 7439-97-6 | Mercury | 0.017 J | 14 J | MG/KG | OU1-SO-SS1-0001 | 26/29 | 0.028 - 0.044 | 14 | 0.127 | 0.23 N | NA | NA | YES | ASL |
| | 7440-02-0 | Nickel | 1.1 J | 16.5 | MG/KG | OU1-SO-SS1-0001 | 27/29 | 2.1 - 9.5 | 16.5 | 6.896 | 15 N | NA | NA | YES | ASL |
| | 7440-09-7 | Potassium | 164 J | 1,630 | MG/KG | OU1-SO-SS2-0001 | 28/29 | 184 - 1190 | 1630 | 481.3 | NA | NA | NA | NO | NUT |
| | 7782-49-2 | Selenium | 0.5 | 1 J | MG/KG | OU1-SS-105-04B | 12/29 | 0.67 - 2.3 | 1 | 0.559 | 3.9 N | NA | NA | NO | BSL |
| | 7440-22-4 | Silver | 0.32 | 6.6 | MG/KG | SO04-0001 | 11/29 | 0.22 - 2.4 | 6.6 | NA | 3.9 N | NA | NA | YES | ASL |
| | 7440-23-5 | Sodium | 34.5 | 3,320 | MG/KG | OU1-SO-SS4-0001 | 29/29 | 794 - 1190 | 3320 | 51.06 | NA | NA | NA | NO | NUT |
| | 7440-28-0 | Thallium | 1.1 J | 1.2 J | MG/KG | OU1-SS-105-04B | 2/29 | 0.34 - 2.8 | 1.2 | NA | NA | NA | NA | NO | BSL |
| | 7440-62-2 | Vanadium | 5.9 J | 93.1 | MG/KG | OU1-SO-SS2-0001 | 29/29 | 7.9 - 11.9 | 93.1 | 19.16 | 3.9 N | NA | NA | YES | ASL |
| | 7440-66-6 | Zinc | 6.2 | 2,970 | MG/KG | OU1-SO-SS3-0001 | 29/29 | 3.2 - 4.7 | 2970 | 11.31 | 230 N | NA | NA | YES | ASL |

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

Table 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Point | CAS Number | Chemical | Minimum [1] Concentration Qualifier | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Detection Frequency | Range of Detection Limits | Concentration Used for Screening [2] | Background Value | Screening [4] Toxicity Value | Potential ARAR/TBC Value | Potential ARAR/TBC Source | COPC Flag | Rationale for Contaminant Deletion or Selection [5] |
|----------------|------------|----------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|------------------------------|--------------------------|---------------------------|-----------|---|
|----------------|------------|----------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|------------------------------|--------------------------|---------------------------|-----------|---|

[3] Two times average background concentration established in Background Evaluation Report for Marine Corps Air Station, Cherry Point, NC (TtNUS, October 1999)

To Be Considered

[4] Oak Ridge National Laboratory (ORNL). November, 2010. Residential Soil Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online]. Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

J = Estimated Value

RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.

K = Biased High

RSL value for anthracene used as surrogate for phenanthrene.

L = Biased Low

RSL value for technical chlordane used as surrogate for alpha-chlordane.

C = Carcinogenic

RSL value for technical chlordane used as surrogate for beta-chlordane.

C* = carcinogenic RSL where: noncarcinogenic RSL < 100 times carcinogenic RSL;

RSL value for technical chlordane used as surrogate for gamma-chlordane.

C** = carcinogenic RSL where: noncarcinogenic RSL < 10 times carcinogenic RSL;

RSL value for Chromium(VI) used as surrogate for chromium.

N = Noncarcinogenic

The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action

NA = Not available/not applicable

Facilities, USEPA, July 14, 1994.

NS = Noncarcinogenic RSL where concentration may exceed saturation level

RSL value for Manganese (water) used as surrogate for manganese.

RSL value for Mercury (inorganic salts) used as surrogate for mercury.

RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)

Essential Nutrient (NUT)

Below Screening Level (BSL)

Chemical from same class (carcinogenic PAH) identified as a COPC (cPAH)

Table 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 16, MCAS Cherry Point

| | |
|-----------------------------|--|
| Scenario Timeframe: Future | |
| Medium: Total Soil | |
| Exposure Medium: Total Soil | |

| Exposure Point | CAS Number | Chemical | Minimum [1] Concentration Qualifier | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Detection Frequency | Range of Detection Limits | Concentration [2] Used for Screening | Background Value | Screening Toxicity Value [4] | Potential ARAR/TBC Value | Potential ARAR/TBC Source | COPC Flag | Rationale for Contaminant Deletion or Selection [5] |
|----------------|------------|----------------------------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|------------------------------|--------------------------|---------------------------|-----------|---|
| Total Soil | 78-93-3 | 2-Butanone | 0.008 J | 0.008 J | MG/KG | SB17-0102 | 1/22 | 0.011 - 0.028 | 0.008 | NA | 2.00E+04 N | NA | NA | NO | BSL |
| | 67-64-1 | Acetone | 0.006 J | 0.089 | MG/KG | SO01-0001 | 7/22 | 0.011 - 0.028 | 0.089 | NA | 6.30E+04 N | NA | NA | NO | BSL |
| | 71-43-2 | Benzene | 0.011 J | 0.011 J | MG/KG | SO10-0001 | 1/22 | 0.011 - 0.028 | 0.011 | NA | 5.40E+00 C* | NA | NA | NO | BSL |
| | 75-09-2 | Methylene chloride | 1.00E-03 J | 0.061 | MG/KG | SO05-0001 | 16/22 | 0.011 - 0.018 | 0.061 | NA | 5.30E+01 C | NA | NA | NO | BSL |
| | 108-88-3 | Toluene | 0.002 J | 0.015 J | MG/KG | SO10-0001 | 7/22 | 0.011 - 0.028 | 0.015 | NA | 4.50E+03 NS | NA | NA | NO | BSL |
| | 91-57-6 | 2-Methylnaphthalene | 0.04 J | 0.2 J | MG/KG | OU1-SS-105-04B | 12/30 | 0.36 - 0.94 | 0.2 | NA | 4.10E+02 N | NA | NA | NO | BSL |
| | 83-32-9 | Acenaphthene | 0.029 J | 0.053 J | MG/KG | OU1-SS-101-04B | 2/30 | 0.36 - 0.94 | 0.053 | NA | 3.30E+03 N | NA | NA | NO | BSL |
| | 120-42-7 | Anthracene | 0.022 J | 0.078 J | MG/KG | OU1-SO-SS1-0001 | 5/30 | 0.36 - 0.94 | 0.078 | NA | 1.70E+04 N | NA | NA | NO | BSL |
| | 56-55-3 | Benz(a)anthracene | 0.034 J | 0.45 J | MG/KG | OU1-SS-101-04B | 18/30 | 0.36 - 0.94 | 0.45 | NA | 2.10E+00 C | NA | NA | YES | cPAH |
| | 50-32-8 | Benz(a)pyrene | 0.03 J | 1.1 J | MG/KG | OU1-SS-101-04B | 19/30 | 0.36 - 0.61 | 1.1 | NA | 2.10E-01 C | NA | NA | YES | ASL |
| | 205-99-2 | Benz(b)fluoranthene | 0.023 J | 2.4 J | MG/KG | OU1-SS-101-04B | 21/30 | 0.36 - 0.93 | 2.4 | NA | 2.10E+00 C | NA | NA | YES | ASL |
| | 191-24-2 | Benz(o,g,i)perylene | 0.041 J | 2.7 J | MG/KG | OU1-SS-101-04B | 17/30 | 0.36 - 0.94 | 2.7 | NA | 1.70E+03 N | NA | NA | NO | BSL |
| | 207-08-9 | Benz(o,k)fluoranthene | 0.035 J | 2.1 J | MG/KG | OU1-SS-101-04B | 15/30 | 0.36 - 0.75 | 2.1 | NA | 2.10E+01 C | NA | NA | YES | cPAH |
| | 117-81-7 | bis(2-Ethylhexyl)phthalate | 0.042 J | 3.6 J | MG/KG | OU1-SS-101-04B | 18/30 | 0.36 - 0.94 | 3.6 | NA | 1.20E+02 C* | NA | NA | NO | BSL |
| | 85-68-7 | Butylbenzylphthalate | 0.61 J | 0.61 J | MG/KG | OU1-SO-SS4-0001 | 1/29 | 0.36 - 0.75 | 0.61 | NA | 9.10E+02 C* | NA | NA | NO | BSL |
| | 86-74-8 | Carbazole | 0.028 J | 0.087 J | MG/KG | OU1-SS-101-04B | 2/30 | 0.36 - 0.94 | 0.087 | NA | 1.50E+04 N | NA | NA | NO | BSL |
| | 218-01-9 | Chrysene | 0.023 J | 1.3 J | MG/KG | OU1-SS-101-04B | 21/30 | 0.36 - 0.61 | 1.3 | NA | 2.10E+02 C | NA | NA | YES | cPAH |
| | 53-70-3 | Dibenz(a,h)anthracene | 0.034 J | 0.056 J | MG/KG | SO08-0001 | 6/29 | 0.36 - 0.94 | 0.056 | NA | 2.10E-01 C | NA | NA | YES | cPAH |
| | 132-64-9 | Dibenzofuran | 0.04 J | 0.059 J | MG/KG | OU1-SS-105-04B | 3/30 | 0.36 - 0.94 | 0.059 | NA | 1.00E+02 N | NA | NA | NO | BSL |
| | 84-66-2 | Diethylphthalate | 0.022 J | 0.022 J | MG/KG | S018-0001 | 1/30 | 0.36 - 0.94 | 0.022 | NA | 4.90E+04 N | NA | NA | NO | BSL |
| | 84-74-2 | Di-n-butylphthalate | 0.022 J | 0.29 J | MG/KG | S006-0001 | 9/30 | 0.36 - 0.94 | 0.29 | NA | 6.20E+03 N | NA | NA | NO | BSL |
| | 206-44-0 | Fluoranthene | 0.023 J | 0.79 J | MG/KG | OU1-SS-101-04B | 20/30 | 0.36 - 0.61 | 0.79 | NA | 2.20E+03 N | NA | NA | NO | BSL |
| | 193-39-5 | Indeno[1,2,3-cd]pyrene | 0.039 J | 0.17 J | MG/KG | SO08-0001 | 16/29 | 0.36 - 0.94 | 0.17 | NA | 2.10E+00 C | NA | NA | YES | cPAH |
| | 91-20-3 | Naphthalene | 0.024 J | 0.11 J | MG/KG | OU1-SS-105-04B | 9/30 | 0.36 - 0.94 | 0.11 | NA | 1.80E+01 C* | NA | NA | NO | BSL |
| | 85-01-8 | Phenanthrene | 0.032 J | 0.41 J | MG/KG | OU1-SS-101-04B | 16/30 | 0.36 - 0.94 | 0.41 | NA | 1.70E+03 N | NA | NA | NO | BSL |
| | 129-00-0 | Pyrene | 0.022 J | 0.87 J | MG/KG | OU1-SO-SS1-0001 | 20/30 | 0.36 - 0.61 | 0.87 | NA | 1.70E+03 N | NA | NA | NO | BSL |
| | 72-54-8 | 4,4'-DDD | 0.0024 J | 0.039 | MG/KG | SB19-0102 | 8/30 | 0.0036 - 0.019 | 0.039 | NA | 7.20E+00 C | NA | NA | NO | BSL |
| | 72-55-9 | 4,4'-DDE | 0.0015 J | 0.032 | MG/KG | SO17-0001 | 13/30 | 0.0036 - 0.0078 | 0.032 | NA | 5.10E+00 C | NA | NA | NO | BSL |
| | 50-29-3 | 4,4'-DDT | 0.0054 | 0.19 J | MG/KG | OU1-SS-101-04B | 16/30 | 0.0036 - 0.047 | 0.19 | NA | 7.00E+00 C* | NA | NA | NO | BSL |
| | 319-84-6 | alpha-BHC | 0.0045 | 0.0045 | MG/KG | OU1-SS-104-04B | 1/30 | 0.0018 - 0.0097 | 0.0045 | NA | 2.70E-01 C | NA | NA | NO | BSL |
| | 5103-71-9 | alpha-Chlordane | 0.0026 | 0.029 J | MG/KG | OU1-SO-S2-0001 | 9/30 | 0.0018 - 0.0097 | 0.029 | NA | 6.50E+00 C* | NA | NA | NO | BSL |
| | 11097-69-1 | Aroclor-1254 | 0.086 | 0.34 | MG/KG | S008-0001 | 6/30 | 0.036 - 0.19 | 0.34 | NA | 7.40E-01 C** | NA | NA | NO | BSL |
| | 11096-82-5 | Aroclor-1260 | 0.022 J | 0.49 | MG/KG | S008-0001 | 11/30 | 0.036 - 0.19 | 0.49 | NA | 7.40E-01 C | NA | NA | NO | BSL |
| | CHLORDANE | beta-Chlordane | 0.0023 | 0.026 | MG/KG | OU1-SO-S2-0001 | 9/22 | 0.0019 - 0.0097 | 0.026 | NA | 6.50E+00 C* | NA | NA | NO | BSL |
| | 60-57-1 | Dieldrin | 0.0017 J | 0.11 | MG/KG | OU1-SS-101-04B | 10/30 | 0.0036 - 0.047 | 0.11 | NA | 1.10E-01 C | NA | NA | NO | BSL |
| | 72-20-8 | Endrin | 0.011 | 0.014 | MG/KG | S001-0001 | 3/30 | 0.0036 - 0.019 | 0.014 | NA | 1.80E+01 N | NA | NA | NO | BSL |
| | 7421-93-4 | Endrin aldehyde | 0.0032 J | 0.032 J | MG/KG | OU1-SS-101-04B | 6/30 | 0.0036 - 0.019 | 0.032 | NA | 1.80E+01 N | NA | NA | NO | BSL |
| | 53494-70-5 | Endrin ketone | 0.0057 | 0.0057 | MG/KG | S001-0001 | 1/30 | 0.0036 - 0.019 | 0.0057 | NA | 1.80E+01 N | NA | NA | NO | BSL |
| | 5103-74-2 | gamma-Chlordane | 0.013 J | 0.013 J | MG/KG | OU1-SS-101-04B | 1/8 | 0.0018 - 0.0026 | 0.013 | NA | 6.50E+00 C* | NA | NA | NO | BSL |
| | 76-44-8 | Heptachlor | 0.0026 | 0.0026 | MG/KG | S001-0001 | 1/30 | 0.0018 - 0.0097 | 0.0026 | NA | 3.80E-01 C | NA | NA | NO | BSL |
| | 1024-57-3 | Heptachlor epoxide | 0.003 | 0.003 | MG/KG | SO09-0001 | 1/30 | 0.0018 - 0.0097 | 0.003 | NA | 1.90E-01 C* | NA | NA | NO | BSL |

Table 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Point | CAS Number | Chemical | Minimum [1] Concentration Qualifier | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Detection Frequency | Range of Detection Limits | Concentration [2] Used for Screening | Background Value | Screening Toxicity Value [4] | Potential ARAR/TBC Value | Potential ARAR/TBC Source | COPC Flag | Rationale for Contaminant Deletion or Selection [5] |
|----------------|------------|-----------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|------------------------------|--------------------------|---------------------------|-----------|---|
| Total Soil | 7429-90-5 | Aluminum | 2,450 | 35,800 | MG/KG | OU1-SO-SS2-0001 | 29/29 | 31.8 - 47.5 | 35800 | 10160 | 9.90E+04 N | NA | NA | NO | BSL |
| | 7440-36-0 | Antimony | 0.98 | 14.5 | MG/KG | SB04-0102 | 6/29 | 0.45 - 14.2 | 14.5 | NA | 4.10E+01 N | NA | NA | NO | BSL |
| | 7440-38-2 | Arsenic | 0.58 J | 70.9 J | MG/KG | OU1-SO-SS1-0001 | 25/29 | 1.5 - 2.4 | 70.9 | 3.902 | 1.60E+00 C* | NA | NA | YES | ASL |
| | 7440-39-3 | Barium | 8.3 | 816 | MG/KG | OU1-SS-101-04B | 29/29 | 31.8 - 47.5 | 816 | 22.99 | 1.90E+04 N | NA | NA | NO | BSL |
| | 7440-41-7 | Beryllium | 0.056 J | 1.4 | MG/KG | OU1-SO-SS1-0001 | 16/29 | 0.18 - 1.2 | 1.4 | NA | 2.00E+02 N | NA | NA | NO | BSL |
| | 7440-42-8 | Boron | 1.1 | 40.5 | MG/KG | OU1-SS-101-04B | 19/24 | 2.4 - 3.6 | 40.5 | NA | 2.00E+04 N | NA | NA | NO | BSL |
| | 7440-43-9 | Cadmium | 0.061 J | 24.5 | MG/KG | SO05-0001 | 19/29 | 0.25 - 2.8 | 24.5 | 1.128 | 8.00E+01 N | NA | NA | NO | BSL |
| | 7440-70-2 | Calcium | 738 J | 38,400 J | MG/KG | OU1-SO-SS3-0001 | 29/29 | 794 - 1190 | 38400 | 511.3 | N/A | NA | NA | NO | NUT |
| | 7440-47-3 | Chromium | 3.7 J | 87.7 | MG/KG | SO07-0001 | 29/29 | 1.6 - 2.4 | 87.7 | 16.96 | 5.60E+00 C | NA | NA | YES | ASL |
| | 7440-48-4 | Cobalt | 0.2 J | 5.7 | MG/KG | SO07-0001 | 25/29 | 0.87 - 11.9 | 5.7 | 2.383 | 3.00E+01 N | NA | NA | NO | BSL |
| | 7440-50-8 | Copper | 0.86 J | 156 | MG/KG | SB04-0102 | 29/29 | 4 - 5.9 | 156 | 3.76 | 4.10E+03 N | NA | NA | NO | BSL |
| | 7439-89-6 | Iron | 2,000 | 23,600 | MG/KG | OU1-SO-SS1-0001 | 29/29 | 15.9 - 23.7 | 23600 | 5959 | 7.20E+04 N | NA | NA | NO | BSL |
| | 7439-92-1 | Lead | 2.8 J | 708 | MG/KG | SB04-0102 | 45/45 | 0.48 - 0.71 | 708 | 10.52 | 8.00E+01 N | NA | NA | YES | ASL |
| | 7439-95-4 | Magnesium | 275 | 3,960 | MG/KG | OU1-SO-SS4-0001 | 29/29 | 794 - 1190 | 3960 | 421.7 | N/A | NA | NA | NO | NUT |
| | 7439-96-5 | Manganese | 10.4 | 393 | MG/KG | OU1-SO-SS4-0001 | 29/29 | 2.4 - 3.6 | 393 | 16.72 | 2.30E+03 N | NA | NA | NO | BSL |
| | 7439-97-6 | Mercury | 0.017 J | 14 J | MG/KG | OU1-SO-SS1-0001 | 26/29 | 0.028 - 0.044 | 14 | 0.127 | 3.40E+00 N | NA | NA | YES | ASL |
| | 7440-02-0 | Nickel | 1.1 J | 16.5 | MG/KG | OU1-SO-SS1-0001 | 27/29 | 2.1 - 9.5 | 16.5 | 6.896 | 2.00E+03 N | NA | NA | NO | BSL |
| | 7440-09-7 | Potassium | 164 J | 1,630 | MG/KG | OU1-SO-SS2-0001 | 28/29 | 184 - 1190 | 1630 | 481.3 | N/A | NA | NA | NO | NUT |
| | 7782-49-2 | Selenium | 0.5 | 1 J | MG/KG | OU1-SS-105-04B | 12/29 | 0.67 - 2.3 | 1 | 0.559 | 5.10E+02 N | NA | NA | NO | BSL |
| | 7440-22-4 | Silver | 0.32 | 6.6 | MG/KG | SO04-0001 | 11/29 | 0.22 - 2.4 | 6.6 | NA | 5.10E+02 N | NA | NA | NO | BSL |
| | 7440-23-5 | Sodium | 34.5 | 3,320 | MG/KG | OU1-SO-SS4-0001 | 29/29 | 794 - 1190 | 3320 | 51.06 | N/A | NA | NA | NO | NUT |
| | 7440-28-0 | Thallium | 1.1 J | 1.2 J | MG/KG | OU1-SS-105-04B | 2/29 | 0.34 - 2.8 | 1.2 | NA | NA | NA | NA | NO | BSL |
| | 7440-62-2 | Vanadium | 5.9 J | 93.1 | MG/KG | OU1-SO-SS2-0001 | 29/29 | 7.9 - 11.9 | 93.1 | 19.16 | 7.20E+00 N | NA | NA | YES | ASL |
| | 7440-66-6 | Zinc | 6.2 | 2,970 | MG/KG | OU1-SO-SS3-0001 | 29/29 | 3.2 - 4.7 | 2970 | 11.31 | 3.10E+04 N | NA | NA | NO | BSL |

[1] Minimum/Maximum detected concentrations.

[2] Maximum concentration is used for screening.

[3] Two times average background concentration established in Background Evaluation Report for Marine Corps Air Station, Cherry Point, NC (TiNUS, October 1999)

Oak Ridge National Laboratory (ORNL). November, 2010. Industrial Soil Regional Screening Levels for Chemical Contaminants at Superfund Sites.

[4] Online. Available:

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

RSL value for pyrene used as surrogate for benzo(a,h,i)perylene.

RSL value for anthracene used as surrogate for phenanthrene.

RSL value for technical chlordane used as surrogate for alpha-chlordane.

RSL value for technical chlordane used as surrogate for beta-chlordane.

RSL value for technical chlordane used as surrogate for gamma-chlordane.

RSL value for Chromium(VI) used as surrogate for chromium.

The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action

Facilities, USEPA, July 14, 1994.

RSL value for Manganese (water) used as surrogate for manganese.

RSL value for Mercury (inorganic salts) used as surrogate for mercury.

RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)

Essential Nutrient (NUT)

Below Screening Level (BSL)

Chemical from same class (carcinogenic PAH) identified as a COPC (cPAH)

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

J = Estimated Value

K = Biased High

L = Biased Low

C = Carcinogenic

C* = carcinogenic RSL where: noncarcinogenic RSL < 100 times carcinogenic RSL;

C** = carcinogenic RSL where: noncarcinogenic RSL < 10 times carcinogenic RSL;

N = Noncarcinogenic

NA = Not available/not applicable

NS = Noncarcinogenic RSL where concentration may exceed saturation level

Table 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 16, MCAS Cherry Point

| |
|----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Air |

| Exposure Point | CAS Number | Chemical | Minimum [1] Concentration Qualifier | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Detection Frequency | Range of Detection Limits | Concentration Used for Screening [2] | Background Value | Background Range [3] | Screening Toxicity Value [4] | Potential ARAR/TBC Value | Potential ARAR/TBC Source | COPC Flag | Rationale for Contaminant Deletion or Selection [5] |
|-----------------------------|------------|----------------------------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|----------------------|------------------------------|--------------------------|---------------------------|-----------|---|
| Emissions from Site 16 Soil | 78-93-3 | 2-Butanone | 5.3E-04 J | 5.3E-04 J | µg/m³ | SB17-0102 | 1/22 | N/A | 5.3E-04 J | NA | NA | 5.20E+02 N | NA | NA | NO | BSL |
| | 67-64-1 | Acetone | 3.6E-04 J | 5.4E-03 | µg/m³ | SO01-0001 | 7/22 | N/A | 5.4E-03 | NA | NA | 3.20E+03 N | NA | NA | NO | BSL |
| | 71-43-2 | Benzene | 2.6E-03 J | 2.6E-03 J | µg/m³ | SO10-0001 | 1/22 | N/A | 2.6E-03 J | NA | NA | 3.10E-01 C* | NA | NA | NO | BSL |
| | 75-09-2 | Methylene chloride | 3.7E-04 J | 2.3E-02 | µg/m³ | SO05-0001 | 16/22 | N/A | 2.3E-02 | NA | NA | 5.20E+00 C | NA | NA | NO | BSL |
| | 108-88-3 | Toluene | 3.8E-04 J | 2.9E-03 J | µg/m³ | SO10-0001 | 7/22 | N/A | 2.9E-03 J | NA | NA | 5.20E+02 NS | NA | NA | NO | BSL |
| | 91-57-6 | 2-Methylnaphthalene | 5.6E-04 J | 2.8E-03 J | µg/m³ | OU1-SS-105-04B | 12/30 | N/A | 2.8E-03 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 83-32-9 | Acenaphthene | 1.7E-04 J | 3.1E-04 J | µg/m³ | OU1-SS-101-04B | 2/30 | N/A | 3.1E-04 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 120-12-7 | Anthracene | 3.5E-05 J | 1.2E-04 J | µg/m³ | OU1-SO-SS1-0001 | 5/30 | N/A | 1.2E-04 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 56-55-3 | Benzo(a)anthracene | 2.5E-08 J | 3.3E-07 J | µg/m³ | OU1-SS-101-04B | 18/30 | N/A | 3.3E-07 J | NA | NA | 8.70E-03 C | NA | NA | NO | BSL |
| | 50-32-8 | Benzo(a)pyrene | 2.2E-08 J | 8.1E-07 J | µg/m³ | OU1-SS-101-04B | 19/30 | N/A | 8.1E-07 J | NA | NA | 8.70E-04 C | NA | NA | NO | BSL |
| | 205-99-2 | Benzo(b)fluoranthene | 1.7E-08 J | 1.8E-06 J | µg/m³ | OU1-SS-101-04B | 21/30 | N/A | 1.8E-06 J | NA | NA | 8.70E-03 C | NA | NA | NO | BSL |
| | 191-24-2 | Benzo(g,h,i)perylene | 1.4E-05 J | 9.4E-04 J | µg/m³ | OU1-SS-101-04B | 17/30 | N/A | 9.4E-04 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 207-08-9 | Benzo(k)fluoranthene | 2.6E-08 J | 1.5E-06 J | µg/m³ | OU1-SS-101-04B | 15/30 | N/A | 1.5E-06 J | NA | NA | 8.70E-03 C | NA | NA | NO | BSL |
| | 117-81-7 | bis(2-Ethylhexyl)phthalate | 3.1E-08 J | 2.6E-06 J | µg/m³ | OU1-SS-101-04B | 18/30 | N/A | 2.6E-06 J | NA | NA | 1.00E+00 C* | NA | NA | NO | BSL |
| | 85-68-7 | Butylbenzylphthalate | 4.5E-07 J | 4.5E-07 J | µg/m³ | OU1-SO-SS4-0001 | 1/29 | N/A | 4.5E-07 J | NA | NA | NA C* | NA | NA | NO | NTX |
| | 86-74-8 | Carbazole | 1.4E-04 J | 4.3E-04 J | µg/m³ | OU1-SS-101-04B | 2/30 | N/A | 4.3E-04 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 218-01-9 | Chrysene | 1.7E-08 J | 9.6E-07 J | µg/m³ | OU1-SS-101-04B | 21/30 | N/A | 9.6E-07 J | NA | NA | 8.70E-02 C | NA | NA | NO | BSL |
| | 53-70-3 | Dibenz(a,h)anthracene | 2.5E-08 J | 4.1E-08 J | µg/m³ | SO08-0001 | 6/29 | N/A | 4.1E-08 J | NA | NA | 8.00E-04 C | NA | NA | NO | BSL |
| | 132-64-9 | Dibenzofuran | 1.7E-04 J | 2.5E-04 J | µg/m³ | OU1-SS-105-04B | 3/30 | N/A | 2.5E-04 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 84-66-2 | Diethylphthalate | 1.6E-08 J | 1.6E-08 J | µg/m³ | SO18-0001 | 1/30 | N/A | 1.6E-08 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 84-74-2 | Di-n-butylphthalate | 1.6E-08 J | 2.1E-07 J | µg/m³ | SO06-0001 | 9/30 | N/A | 2.1E-07 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 206-44-0 | Fluoranthene | 1.7E-08 J | 5.8E-07 J | µg/m³ | OU1-SS-101-04B | 20/30 | N/A | 5.8E-07 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 193-39-5 | Indeno[1,2,3-cd]pyrene | 2.9E-08 J | 1.3E-07 J | µg/m³ | SO08-0001 | 16/29 | N/A | 1.3E-07 J | NA | NA | 8.70E-03 C | NA | NA | NO | BSL |
| | 91-20-3 | Naphthalene | 4.2E-04 J | 1.9E-03 J | µg/m³ | OU1-SS-105-04B | 9/30 | N/A | 1.9E-03 J | NA | NA | 7.20E-02 C* | NA | NA | NO | BSL |
| | 85-01-8 | Phenanthrene | 5.0E-05 J | 6.5E-04 J | µg/m³ | OU1-SS-101-04B | 16/30 | N/A | 6.5E-04 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 129-00-0 | Pyrene | 7.6E-06 J | 3.0E-04 J | µg/m³ | OU1-SO-SS1-0001 | 20/30 | N/A | 3.0E-04 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 72-54-8 | 4,4'-DDD | 1.8E-09 J | 2.9E-08 | µg/m³ | SB19-0102 | 8/30 | N/A | 2.9E-08 | NA | NA | 3.50E-02 C | NA | NA | NO | BSL |
| | 72-55-9 | 4,4'-DDE | 1.1E-09 J | 2.4E-08 | µg/m³ | SO17-0001 | 13/30 | N/A | 2.4E-08 | NA | NA | 2.50E-02 C | NA | NA | NO | BSL |
| | 50-29-3 | 4,4'-DDT | 4.0E-09 | 1.4E-07 J | µg/m³ | OU1-SS-101-04B | 16/30 | N/A | 1.4E-07 J | NA | NA | 2.50E-02 C* | NA | NA | NO | BSL |
| | 319-84-6 | alpha-BHC | 3.3E-09 | 3.3E-09 | µg/m³ | OU1-SS-104-04B | 1/30 | N/A | 3.3E-09 | NA | NA | 1.40E-03 C | NA | NA | NO | BSL |
| | 5103-71-9 | alpha-Chlordane | 1.9E-09 | 2.1E-08 J | µg/m³ | OU1-SO-SS2-0001 | 9/30 | N/A | 2.1E-08 J | NA | NA | 2.40E-02 C* | NA | NA | NO | BSL |
| | 11097-69-1 | Aroclor-1254 | 6.3E-08 | 2.5E-07 | µg/m³ | SO08-0001 | 6/30 | N/A | 2.5E-07 | NA | NA | 4.30E-03 C** | NA | NA | NO | BSL |
| | 11096-82-5 | Aroclor-1260 | 1.6E-08 J | 3.6E-07 | µg/m³ | SO08-0001 | 11/30 | N/A | 3.6E-07 | NA | NA | 4.30E-03 C | NA | NA | NO | BSL |
| | CHLORDANE | beta-Chlordane | 1.7E-09 | 1.9E-08 | µg/m³ | OU1-SO-SS2-0001 | 9/22 | N/A | 1.9E-08 | NA | NA | 2.40E-02 C* | NA | NA | NO | BSL |
| | 60-57-1 | Dieldrin | 1.3E-09 J | 8.1E-08 | µg/m³ | OU1-SS-101-04B | 10/30 | N/A | 8.1E-08 | NA | NA | 5.30E-04 C | NA | NA | NO | BSL |
| | 72-20-8 | Endrin | 8.1E-09 | 1.0E-08 | µg/m³ | SO01-0001 | 3/30 | N/A | 1.0E-08 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7421-93-4 | Endrin aldehyde | 2.4E-09 J | 2.4E-08 J | µg/m³ | OU1-SS-101-04B | 6/30 | N/A | 2.4E-08 J | NA | NA | NA N | NA | NA | NO | NTX |
| | 53494-70-5 | Endrin ketone | 4.2E-09 | 4.2E-09 | µg/m³ | SO01-0001 | 1/30 | N/A | 4.2E-09 | NA | NA | NA N | NA | NA | NO | NTX |
| | 5103-74-2 | gamma-Chlordane | 9.6E-09 J | 9.6E-09 J | µg/m³ | OU1-SS-101-04B | 1/8 | N/A | 9.6E-09 J | NA | NA | 2.40E-02 C* | NA | NA | NO | BSL |
| | 76-44-8 | Heptachlor | 1.9E-09 | 1.9E-09 | µg/m³ | SO01-0001 | 1/30 | N/A | 1.9E-09 | NA | NA | 1.90E-03 C | NA | NA | NO | BSL |
| | 1024-57-3 | Heptachlor epoxide | 2.2E-09 | 2.2E-09 | µg/m³ | SO09-0001 | 1/30 | N/A | 2.2E-09 | NA | NA | 9.40E-04 C* | NA | NA | NO | BSL |
| Total Soil | 7429-90-5 | Aluminum | 1.8E-03 | 2.6E-02 | µg/m³ | OU1-SO-SS2-0001 | 29/29 | N/A | 2.6E-02 | NA | NA | 5.20E-01 N | NA | NA | NO | BSL |
| | 7440-36-0 | Antimony | 7.2E-07 | 1.1E-05 | µg/m³ | SB04-0102 | 6/29 | N/A | 1.1E-05 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7440-38-2 | Arsenic | 4.3E-07 J | 5.2E-05 J | µg/m³ | OU1-SO-SS1-0001 | 25/29 | N/A | 5.2E-05 J | NA | NA | 5.70E-04 C* | NA | NA | NO | BSL |
| | 7440-39-3 | Barium | 6.1E-06 | 6.0E-04 | µg/m³ | OU1-SS-101-04B | 29/29 | N/A | 6.0E-04 | NA | NA | 5.20E-02 N | NA | NA | NO | BSL |
| | 7440-41-7 | Beryllium | 4.1E-08 J | 1.0E-06 | µg/m³ | OU1-SO-SS1-0001 | 16/29 | N/A | 1.0E-06 | NA | NA | 1.00E-03 N | NA | NA | NO | BSL |

Table 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
Site 16, MCAS Cherry Point

Scenario Timeframe: Future
Medium: Total Soil
Exposure Medium: Air

| Exposure Point | CAS Number | Chemical | Minimum [1] Concentration Qualifier | Maximum [1] Concentration Qualifier | Units | Location of Maximum Concentration | Detection Frequency | Range of Detection Limits | Concentration Used for Screening [2] | Background Value | Background Range [3] | Screening Toxicity Value [4] | Potential ARAR/TBC Value | Potential ARAR/TBC Source | COPC Flag | Rationale for Contaminant Deletion or Selection [5] |
|----------------|------------|-----------|-------------------------------------|-------------------------------------|-------|-----------------------------------|---------------------|---------------------------|--------------------------------------|------------------|----------------------|------------------------------|--------------------------|---------------------------|-----------|---|
| | 7440-42-8 | Boron | 8.1E-07 | 3.0E-05 | µg/m³ | OU1-SS-101-04B | 19/24 | N/A | 3.0E-05 | NA | NA | 2.10E+00 N | NA | NA | NO | BSL |
| | 7440-43-9 | Cadmium | 4.5E-08 J | 1.8E-05 | µg/m³ | SO05-0001 | 19/29 | N/A | 1.8E-05 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7440-70-2 | Calcium | 5.4E-04 J | 2.8E-02 J | µg/m³ | OU1-SO-SS3-0001 | 29/29 | N/A | 2.8E-02 J | NA | NA | NA | NA | NA | NO | NUT |
| | 7440-47-3 | Chromium | 2.7E-06 J | 6.4E-05 | µg/m³ | SO07-0001 | 29/29 | N/A | 6.4E-05 | NA | NA | 1.10E-05 C | NA | NA | YES | ASL |
| | 7440-48-4 | Cobalt | 1.5E-07 J | 4.2E-06 | µg/m³ | SO07-0001 | 25/29 | N/A | 4.2E-06 | NA | NA | 2.70E-04 N | NA | NA | NO | BSL |
| | 7440-50-8 | Copper | 6.3E-07 J | 1.1E-04 | µg/m³ | SB04-0102 | 29/29 | N/A | 1.1E-04 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7439-89-6 | Iron | 1.5E-03 | 1.7E-02 | µg/m³ | OU1-SO-SS1-0001 | 29/29 | N/A | 1.7E-02 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7439-92-1 | Lead | 2.1E-06 J | 5.2E-04 | µg/m³ | SB04-0102 | 45/45 | N/A | 5.2E-04 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7439-95-4 | Magnesium | 2.0E-04 | 2.9E-03 | µg/m³ | OU1-SO-SS4-0001 | 29/29 | N/A | 2.9E-03 | NA | NA | NA | NA | NA | NO | NUT |
| | 7439-96-5 | Manganese | 7.6E-06 | 2.9E-04 | µg/m³ | OU1-SO-SS4-0001 | 29/29 | N/A | 2.9E-04 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7439-97-6 | Mercury | 1.3E-08 J | 1.0E-05 J | µg/m³ | OU1-SO-SS1-0001 | 26/29 | N/A | 1.0E-05 J | NA | NA | 3.10E-02 N | NA | NA | NO | BSL |
| | 7440-02-0 | Nickel | 8.1E-07 J | 1.2E-05 | µg/m³ | OU1-SO-SS1-0001 | 27/29 | N/A | 1.2E-05 | NA | NA | 9.40E-03 N | NA | NA | NO | BSL |
| | 7440-09-7 | Potassium | 1.2E-04 J | 1.2E-03 | µg/m³ | OU1-SO-SS2-0001 | 28/29 | N/A | 1.2E-03 | NA | NA | NA | NA | NA | NO | NUT |
| | 7782-49-2 | Selenium | 3.7E-07 | 7.4E-07 J | µg/m³ | OU1-SS-105-04B | 12/29 | N/A | 7.4E-07 J | NA | NA | 2.10E+00 N | NA | NA | NO | BSL |
| | 7440-22-4 | Silver | 2.4E-07 | 4.9E-06 | µg/m³ | SO04-0001 | 11/29 | N/A | 4.9E-06 | NA | NA | NA N | NA | NA | NO | NTX |
| | 7440-23-5 | Sodium | 2.5E-05 | 2.4E-03 | µg/m³ | OU1-SO-SS4-0001 | 29/29 | N/A | 2.4E-03 | NA | NA | NA | NA | NA | NO | NUT |
| | 7440-28-0 | Thallium | 8.1E-07 J | 8.8E-07 J | µg/m³ | OU1-SS-105-04B | 2/29 | N/A | 8.8E-07 J | NA | NA | NA | NA | NA | NO | NTX |
| | 7440-62-2 | Vanadium | 4.3E-06 J | 6.8E-05 | µg/m³ | OU1-SO-SS2-0001 | 29/29 | N/A | 6.8E-05 | NA | NA | 1.00E-02 N | NA | NA | NO | BSL |
| | 7440-66-6 | Zinc | 4.6E-06 | 2.2E-03 | µg/m³ | OU1-SO-SS3-0001 | 29/29 | N/A | 2.2E-03 | NA | NA | NA N | NA | NA | NO | NTX |

[1] Minimum/Maximum calculated air concentrations from soil concentrations. Air concentrations calculated as $C_{air} = C_{soil} * 1000 * (1/PEF + 1/VF)$.

PEF = $1.36E+09 \text{ m}^3/\text{kg}$. VF calculated for volatile constituents only, on Table 2.3A. PEF and VF from USEPA's Soil Screening Guidance. (USEPA, July 1996)

COPC = Chemical of Potential Concern

[2] Maximum concentration is used for screening.

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/

To Be Considered

[3] Two times average background concentration established in Background Evaluation Report for Marine Corps Air Station, Cherry Point, NC (TnUS, October 1999)

Oak Ridge National Laboratory (ORNL). November, 2010. Residential Air Regional Screening Levels for Chemical Contaminants at Superfund Sites. [Online].

[4] Available: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

J = Estimated Value

K = Biased High

L = Biased Low

C = Carcinogenic

N = Noncarcinogenic

RSL value for pyrene used as surrogate for benzo(g,h,i)perylene.

RSL value for anthracene used as surrogate for phenanthrene.

RSL value for technical chlordane used as surrogate for alpha-chlordane.

RSL value for technical chlordane used as surrogate for beta-chlordane.

RSL value for technical chlordane used as surrogate for gamma-chlordane.

RSL value for Chromium(VI) used as surrogate for chromium.

NA = Not available/not applicable

The soil value of 400 mg/kg for lead is from the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action

Facilities, USEPA, July 14, 1994.

RSL value for Manganese (water) used as surrogate for manganese.

RSL value for Mercury (inorganic salts) used as surrogate for mercury.

RSL value for endrin used as surrogate for endrin aldehyde and endrin ketone.

[5] Rationale Codes

Selection Reason: Above Screening Levels (ASL)

Deletion Reason: No Toxicity Information (NTX)

Essential Nutrient (NUT)

Below Screening Level (BSL)

[1] Minimum/Maximum calculated air concentrations from surface soil concentrations. Air concentrations calculated as $C_{air} = C_{soil} * 1000 * (1/PEF + 1/VF)$.

PEF = $1.36E+09 \text{ m}^3/\text{kg}$. VF calculated for volatile constituents only, on Table 2.2A. PEF and VF from USEPA's Soil Screening Guidance. (USEPA, July 1996)

TABLE 2.3A
CALCULATION OF VOLATILIZATION FACTOR
Site 16, MCAS Cherry Point

| Chemical | CAS Number | Diffusivity in Air (D_i) (cm^2/s) | Henry's Law Constant (H') (unitless) | Diffusivity in Water (D_w) (cm^2/s) | Soil Organic Carbon Partition Coeff. (K_{oc}) (L/kg) | Soil Water Partition Coeff. ($K_d = K_{oc} \times F_{oc}$) (g/cm^3) | Solubility in Water (S) (mg/L) | Apparent Diffusivity (D_A) (cm^2/s) | Volatile Factor (VF) (m^3/kg) | Soil Saturation Concentration (C_{sat}) (mg/kg) |
|---------------------|------------|---|--|---|---|--|---|---|---|--|
| 2-Butanone | 78-93-3 | 9.10E-02 | 2.30E-03 | 1.00E-05 | 4.51E+00 | 2.71E-02 | 2.23E+05 | 8.80E-05 | 1.50E+04 | 2.84E+04 |
| Acetone | 67-64-1 | 1.10E-01 | 1.40E-03 | 1.10E-05 | 2.36E+00 | 1.42E-02 | 1.00E+06 | 7.23E-05 | 1.65E+04 | 1.14E+05 |
| Benzene | 71-43-2 | 9.00E-02 | 2.30E-01 | 1.00E-05 | 1.46E+02 | 8.75E-01 | 1.79E+03 | 1.08E-03 | 4.27E+03 | 1.82E+03 |
| Methylene chloride | 75-09-2 | 1.00E-01 | 1.30E-01 | 1.30E-05 | 2.17E+01 | 1.30E-01 | 1.30E+04 | 2.72E-03 | 2.70E+03 | 3.31E+03 |
| Toluene | 108-88-3 | 7.80E-02 | 2.70E-01 | 9.20E-06 | 2.34E+02 | 1.40E+00 | 5.26E+02 | 7.22E-04 | 5.24E+03 | 8.18E+02 |
| 2-Methylnaphthalene | 91-57-6 | 5.20E-02 | 2.10E-02 | 7.80E-06 | 2.48E+03 | 1.49E+01 | 2.46E+01 | 3.89E-06 | 7.13E+04 | 3.68E+02 |
| Acenaphthene | 83-32-9 | 5.10E-02 | 7.50E-03 | 8.30E-06 | 5.03E+03 | 3.02E+01 | 3.90E+00 | 6.75E-07 | 1.71E+05 | 1.18E+02 |
| Anthracene | 120-12-7 | 3.90E-02 | 2.30E-03 | 7.90E-06 | 1.64E+04 | 9.82E+01 | 4.34E-02 | 4.91E-08 | 6.34E+05 | 4.26E+00 |
| Carbazole* | 86-74-8 | 3.90E-02 | 3.38E-03 | 7.03E-06 | 2.45E+03 | 1.47E+01 | 7.21E-01 | 4.76E-07 | 2.04E+05 | 1.07E+01 |
| Dibenzofuran | 132-64-9 | 4.10E-02 | 8.70E-03 | 7.40E-06 | 9.16E+03 | 5.50E+01 | 3.10E+00 | 3.46E-07 | 2.39E+05 | 1.71E+02 |
| Naphthalene | 91-20-3 | 6.00E-02 | 1.80E-02 | 8.40E-06 | 1.54E+03 | 9.26E+00 | 3.10E+01 | 6.15E-06 | 5.67E+04 | 2.90E+02 |
| Phenanthrene | 85-01-8 | 3.90E-02 | 2.30E-03 | 7.90E-06 | 1.64E+04 | 9.82E+01 | 4.34E-02 | 4.91E-08 | 6.34E+05 | 4.26E+00 |
| Pyrene | 129-00-0 | 2.80E-02 | 4.90E-04 | 7.20E-06 | 5.43E+04 | 3.26E+02 | 1.35E-01 | 2.38E-09 | 2.88E+06 | 4.40E+01 |

Volatilization factor (VF) =
(m^3/kg)

$$\frac{Q/C * (3.14 * D_A * T)^{1/2} * 10^{-4}}{2 * r_b * D_A} \text{ m}^2/\text{cm}^2$$

Apparent Diffusivity (D_A) =
(cm^2/s)

$$\frac{[(Q_a^{10/3} * D_i * H' + Q_w^{10/3} * D_w)/n^2]}{(r_b * K_d + Q_w + Q_a * H')} \text{ cm}^2/\text{s}$$

Soil Saturation Concentration (C_{sat}) =

$$S/r_b * (K_d * r_b + Q_w + H' * Q_a) \text{ mg/kg}$$

Parameters

Q/C - Inverse of the mean concentration at the center of a 0.5-acre-square source located in Raleigh-Durham, NC ($\text{g/m}^2\text{-s per kg/m}^3$)

T - Exposure interval(s)

ρ_b - Soil bulk density (g/cm^3)

Θ_a - Air-filled soil porosity (L_{air}/L_{water}) = n - Θ_w

n - Total soil porosity (L_{pore}/L_{soil}) = 1 - (ρ_b/ρ_s)

Θ_w - Water-filled soil porosity (L_{water}/L_{soil})

ρ_s - Soil particle density (g/cm^3)

f_{oc} - fraction organic carbon in soil (g/g)

Values

77.26

9.5E+08

1.5

0.28

0.43

0.15

2.65

0.006

Notes:

Equations from USEPA, 1996. *Soil Screening Guidance: User's Guide*. EPA/540/R-96/018.

Physical/chemical properties from Oak Ridge National Laboratory (ORNL). May 2010. Regional Screening Levels for Chemical Contaminants at Superfund Sites.

* Physical/chemical properties from Commission on Environmental Quality (<http://www.tceq.state.tx.us/remediation/trrp/trrppcls.html>), Risk Assessment Information System (<http://rais.ornl.gov/>)

Table 3.1.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Point | Chemical of Potential Concern | Units | Arithmetic Mean | 95% UCL (Distribution) | | Maximum Concentration (Qualifier) | Exposure Point Concentration | | | | |
|----------------|-------------------------------|-------|-----------------|------------------------|------|-----------------------------------|------------------------------|--------|-----------|-------------------------------|------------|
| | | | | | | | Value | Units | Statistic | Rationale | |
| Total Soil | Benzo(a)anthracene | MG/KG | 0.124 | 0.16 | (NP) | 0.45 | J | 0.16 | MG/KG | 95% KM-t | 1, 3, 5 |
| | Benzo(a)pyrene | MG/KG | 0.155 | 0.22 | (NP) | 1.10 | J | 0.22 | MG/KG | 95% KM-BCA | 1, 5 |
| | Benzo(b)fluoranthene | MG/KG | 0.257 | 0.41 | (NP) | 2.40 | J | 0.41 | MG/KG | 95% KM-BCA | 1, 5 |
| | Benzo(k)fluoranthene | MG/KG | 0.217 | 0.34 | (NP) | 2.10 | J | 0.34 | MG/KG | 95% KM-t | 1, 5 |
| | Chrysene | MG/KG | 0.272 | 0.26 | (NP) | 1.30 | J | 0.26 | MG/KG | 95% KM (Percentile Bootstrap) | 1, 3, 5 |
| | Dibenz(a,h)anthracene | MG/KG | 0.043 | 0.048 | (NP) | 0.0560 | J | 0.05 | MG/KG | 95% KM-t | 1, 2, 3, 5 |
| | Indeno(1,2,3-cd)pyrene | MG/KG | 0.101 | 0.12 | (NP) | 0.170 | J | 0.12 | MG/KG | 95% KM-t | 1, 2, 3, 5 |
| | Aroclor-1254 | MG/KG | 0.111 | 0.13 | (NP) | 0.340 | | 0.13 | MG/KG | 95% KM-t | 1, 2, 3, 5 |
| | Aroclor-1260 | MG/KG | 0.092 | 0.14 | (NP) | 0.490 | | 0.14 | MG/KG | 95% KM-t | 2, 3, 5 |
| | Dieldrin | MG/KG | 0.007 | 0.014 | (NP) | 0.110 | | 0.01 | MG/KG | 95% KM-BCA | 4, 5 |
| | Aluminum | MG/KG | 7,578 | 13310 | (NP) | 35,800 | | 13,310 | MG/KG | 95% Chebyshev | 4, 5 |
| | Antimony | MG/KG | 1.574 | 2.429 | (NP) | 14.5 | | 2.43 | MG/KG | 95% KM-t | 1, 2, 3, 5 |
| | Arsenic | MG/KG | 6.617 | 21.92 | (NP) | 70.9 | J | 21.92 | MG/KG | 97.5% KM (Chebyshev) | 2, 5 |
| | Barium | MG/KG | 84.97 | 121.3 | (G) | 816 | | 121.30 | MG/KG | 95% Approx. Gamma | 1, 3 |
| | Cadmium | MG/KG | 1.832 | 7.11 | (NP) | 24.5 | | 7.11 | MG/KG | 97.5% KM (Chebyshev) | 1, 5 |
| | Chromium | MG/KG | 18.07 | 23.91 | (G) | 87.7 | | 23.91 | MG/KG | 95% Approx. Gamma | 3 |
| | Cobalt | MG/KG | 1.69 | 2.167 | (NP) | 5.70 | | 2.17 | MG/KG | 95% KM-BCA | 1, 3, 5 |
| | Copper | MG/KG | 23.07 | 34.6 | (G) | 156 | | 34.60 | MG/KG | 95% Approx. Gamma | 3 |
| | Iron | MG/KG | 8522 | 11165 | (G) | 23,600 | | 11,165 | MG/KG | 95% Approx. Gamma | 3 |
| | Lead | MG/KG | 117.6 | 149.4 | (G) | 708 | | 149 | MG/KG | 95% Approx. Gamma | 3 |
| | Manganese | MG/KG | 74.53 | 103.3 | (G) | 393 | | 103 | MG/KG | 95% Approx. Gamma | 1, 3 |
| | Mercury | MG/KG | 0.708 | 3.698 | (NP) | 14.0 | J | 3.7 | MG/KG | 97.5% KM (Chebyshev) | 1, 5 |
| | Thallium | MG/KG | 1.106 | 1.12 | (NP) | 1.20 | J | 1.2 | MG/KG | Maximum Detected Conc. | 6 |
| | Vanadium | MG/KG | 20.93 | 37.47 | (NP) | 93.1 | | 37 | MG/KG | 95% Chebyshev | 4, 5 |

Table 3.1.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Point | Chemical of Potential Concern | Units | Arithmetic Mean | 95% UCL (Distribution) | | Maximum Concentration (Qualifier) | Exposure Point Concentration | | | |
|----------------|--|-------|--------------------|---------------------------|-----|---|------------------------------|-------|-------------------|-----------|
| | | | | | | | Value | Units | Statistic | Rationale |
| | Zinc | MG/KG | 489.1 | 810.9 | (G) | 2,970 | 811 | MG/KG | 95% Approx. Gamma | 3 |

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% KM (t) UCL; 95% KM (z) UCL; 95% KM (jackknife) UCL;

99% KM (Chebyshev) UCL; 97.5% KM (Chebyshev) UCL; 95% KM (Chebyshev) UCL;

95% KM (bootstrap t) UCL; 95% Student's-T test UCL (95% Stud-t); 95% KM (BCA) UCL; 95% H-UCL; 95% Hall's Bootstrap;

95% KM (Percentile Bootstrap) UCL; 95% Approximate Gamma (App. Gamma); 95% Adjusted Gamma (Adj. Gamma);

95% Chebyshev (Mean, Sd) UCL (95% Cheb-m); 99% Chebyshev (Mean, Sd) UCL (99% Cheb-m)

Upper Confidence Limit (UCL) Rationale:

- (1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
- (2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
- (3) Test indicates data are gamma distributed.
- (4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
- (5) Nonparametric statistical tests were used to calculate the recommended UCL.
- (6) The maximum detected concentration was used as the EPC because there are less than 4 detects.

LD = Lognormal Distribution

ND = Normal Distribution

G = Approximate Gamma Distribution

Table 3.1.CTE
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 16, MCAS Cherry Point

Scenario Timeframe: Future

Medium: Total Soil

Exposure Medium: Total Soil

| Exposure Point | Chemical of Potential Concern | Units | Arithmetic Mean | 95% UCL (Distribution) | | Maximum Concentration (Qualifier) | Exposure Point Concentration | | | |
|----------------|-------------------------------|-------|-----------------|------------------------|------|-----------------------------------|------------------------------|--------|-----------|-------------------------------|
| | | | | | | | Value | Units | Statistic | Rationale |
| Total Soil | Benzo(a)anthracene | MG/KG | 0.12 | 0.16 | (NP) | 0.45 | J | 0.12 | MG/KG | 95% KM-t |
| | Benzo(a)pyrene | MG/KG | 0.16 | 0.22 | (NP) | 1.1 | J | 0.16 | MG/KG | 95% KM-BCA |
| | Benzo(b)fluoranthene | MG/KG | 0.26 | 0.41 | (NP) | 2.4 | J | 0.26 | MG/KG | 95% KM-BCA |
| | Benzo(k)fluoranthene | MG/KG | 0.22 | 0.34 | (NP) | 2.1 | J | 0.22 | MG/KG | 95% KM-t |
| | Chrysene | MG/KG | 0.272 | 0.26 | (NP) | 1.3 | J | 0.27 | MG/KG | 95% KM (Percentile Bootstrap) |
| | Dibenz(a,h)anthracene | MG/KG | 0.04 | 0.05 | (NP) | 0.056 | J | 0.043 | MG/KG | 95% KM-t |
| | Indeno(1,2,3-cd)pyrene | MG/KG | 0.10 | 0.12 | (NP) | 0.17 | J | 0.10 | MG/KG | 95% KM-t |
| | Aroclor-1254 | MG/KG | 0.11 | 0.13 | (NP) | 0.34 | | 0.11 | MG/KG | 95% KM-t |
| | Aroclor-1260 | MG/KG | 0.09 | 0.14 | (NP) | 0.49 | | 0.092 | MG/KG | 95% KM-t |
| | Dieldrin | MG/KG | 0.007 | 0.014 | (NP) | 0.11 | | 0.0069 | MG/KG | 95% KM-BCA |
| | Aluminum | MG/KG | 7,578 | 13,310 | (NP) | 35,800 | | 7,578 | MG/KG | 95% Chebyshev |
| | Antimony | MG/KG | 1.6 | 2.43 | (NP) | 14.5 | | 1.6 | MG/KG | 95% KM-t |
| | Arsenic | MG/KG | 6.6 | 21.9 | (NP) | 70.9 | J | 6.6 | MG/KG | 97.5% KM (Chebyshev) |
| | Barium | MG/KG | 85 | 121 | (G) | 816.0 | | 85 | MG/KG | 95% Approx. Gamma |
| | Cadmium | MG/KG | 1.8 | 7.11 | (NP) | 24.5 | | 1.8 | MG/KG | 97.5% KM (Chebyshev) |
| | Chromium | MG/KG | 18 | 23.91 | (G) | 87.7 | | 18 | MG/KG | 95% Approx. Gamma |
| | Cobalt | MG/KG | 1.7 | 2.17 | (NP) | 5.70 | | 1.7 | MG/KG | 95% KM-BCA |
| | Copper | MG/KG | 23.1 | 34.6 | (G) | 156 | | 23.1 | MG/KG | 95% Approx. Gamma |
| | Iron | MG/KG | 8,522 | 11,165 | (G) | 23,600 | | 8,522 | MG/KG | 95% Approx. Gamma |
| | Lead | MG/KG | 118 | 149.4 | (G) | 708 | | 118 | MG/KG | 95% Approx. Gamma |
| | Manganese | MG/KG | 75 | 103.3 | (G) | 393 | | 74.5 | MG/KG | 95% Approx. Gamma |
| | Mercury | MG/KG | 0.7 | 3.7 | (NP) | 14 | J | 0.71 | MG/KG | 97.5% KM (Chebyshev) |
| | Thallium | MG/KG | 1.1 | 1.12 | (NP) | 1.2 | J | 1.11 | MG/KG | Maximum Detected Conc. |
| | Vanadium | MG/KG | 21 | 37.47 | (NP) | 93.1 | | 20.9 | MG/KG | 95% Chebyshev |
| | Zinc | MG/KG | 489 | 811 | (G) | 2,970 | | 489 | MG/KG | 95% Approx. Gamma |

Table 3.1.CTE
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Point | Chemical of Potential Concern | Units | Arithmetic Mean | 95% UCL (Distribution) | | Maximum Concentration (Qualifier) | Exposure Point Concentration | | | |
|----------------|--|-------|--------------------|---------------------------|--|---|------------------------------|-------|-----------|-----------|
| | | | | | | | Value | Units | Statistic | Rationale |
| | | | | | | | | | | |

Full statistics for data included in Appendix.

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Options: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T);

Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

Upper Confidence Limit (UCL) Rationale:

- (1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed.
- (2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
- (3) Test indicates data are gamma distributed.
- (4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
- (5) Nonparametric statistical tests were used to calculate the recommended UCL.
- (6) The maximum detected concentration was used as the EPC because there are less than 4 detects.

LD = Lognormal Distribution

ND = Normal Distribution

G = Approximate Gamma Distribution

Table 3.2.RME
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
Site 16, MCAS Cherry Point

| |
|----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Air |

| Exposure Point | Chemical of Potential Concern | Units | Arithmetic Mean | 95% UCL (Distribution) | | Maximum Concentration (Qualifier) | Exposure Point Concentration | | | |
|-----------------------------|-------------------------------|-------------------|-----------------|------------------------|-----|-----------------------------------|------------------------------|-------------------|-------------------|-----------|
| | | | | | | | Value | Units | Statistic | Rationale |
| Emissions from Site 16 Soil | Chromium | µg/m ³ | 1.37E-05 | 1.81E-05 | (G) | 6.64E-05 | 1.81E-05 | µg/m ³ | 95% Approx. Gamma | 3 |

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the maximum value was used in the calculation.

Arithmetic Mean, 95% UCL, and Maximum Concentration calculated air concentrations from soil concentrations. Air concentrations calculated as $C_{air} = C_{soil} * 1000 * (1/PEF + 1/VF)$.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% KM (t) UCL; 95% KM (z) UCL; 95% KM (jackknife) UCL;

99% KM (Chebyshev) UCL; 97.5% KM (Chebyshev) UCL; 95% KM (Chebyshev) UCL;

95% KM (bootstrap t) UCL; 95% Student's-T test UCL (95% Stud-t); 95% KM (BCA) UCL; 95% H-UCL; 95% Hall's Bootstrap;

95% KM (Percentile Bootstrap) UCL; 95% Approximate Gamma (App. Gamma); 95% Adjusted Gamma (Adj. Gamma);

95% Chebyshev (Mean, Sd) UCL (95% Cheb-m); 99% Chebyshev (Mean, Sd) UCL (99% Cheb-m)

Upper Confidence Limit (UCL) Rationale:

- (1) Shapiro-Wilk W Test/Lilliefors test indicates data are log-normally distributed. µg/m³ = micrograms per cubic meter
- (2) Shapiro-Wilk W Test/Lilliefors indicates data are normally distributed.
- (3) Test indicates data are gamma distributed.
- (4) Distribution tests are inconclusive (data are not normal, log-normal, or gamma-distributed).
- (5) Nonparametric statistical tests were used to calculate the recommended UCL.
- (6) The maximum detected concentration was used as the EPC because there are less than 4 detects.

LD = Lognormal Distribution

ND = Normal Distribution

G = Approximate Gamma Distribution

TABLE 4.1.RME
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|--|---|--|--|---|--|
| Ingestion | Industrial Worker | Adult | Total Soil | CS IR-S EF ED CF BW AT-C AT-N | Chemical Concentration in Soil Ingestion Rate of Soil Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 100 250 25 0.000001 70 25,550 9,125 | mg/kg mg/day days/year years kg/mg kg days days | See Table 3.1 RME EPA, 1991 EPA, 1991 EPA, 1991 -- EPA, 1991 EPA, 1989 EPA, 1989 | Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT |
| | Maintenance Worker | Adult | Total Soil | CS IR-S EF ED CF BW AT-C AT-N | Chemical Concentration in Soil Ingestion Rate of Soil Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 100 52 25 0.000001 70 25,550 9,125 | mg/kg mg/day days/year years kg/mg kg days days | See Table 3.1 RME EPA, 1991 (1) EPA, 1991 -- EPA, 1991 EPA, 1989 EPA, 1989 | Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF x 1/BW x 1/AT |
| | Trespasser/Visitor | Adult | Total Soil | CS IR-S EF ED CF BW AT-C AT-N | Chemical Concentration in Soil Ingestion Rate of Soil Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 100 52 24 0.000001 70 25,550 8,760 | mg/kg mg/day days/year years kg/mg kg days days | See Table 3.1 RME EPA, 1991 (1) EPA, 1991 -- EPA, 1991 EPA, 1989 EPA, 1989 | Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT |
| | | Youth | Total Soil | CS IR-S EF ED CF BW AT-C AT-N | Chemical Concentration in Soil Ingestion Rate of Soil Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 100 52 10 0.000001 45 25,550 3,650 | mg/kg mg/day days/year years kg/mg kg days days | See Table 3.1 RME EPA, 1991 (1) (2) -- EPA, 2000 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT |
| | | Child | Total Soil | CS IR-S EF ED CF BW AT-C AT-N | Chemical Concentration in Soil Ingestion Rate of Soil Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 200 52 6 0.000001 15 25,550 2,190 | mg/kg mg/day days/year years kg/mg kg days days | See Table 3.1 RME EPA, 1991 (1) EPA, 1991 -- EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x IR-S x EF x ED x CF1 x 1/BW x 1/AT |

TABLE 4.1.RME
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|---|--|--|--|---|---|
| Dermal | Industrial Worker | Adult | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 3,300 0.2 chem specific 0.000001 250 25 70 25,550 9,125 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days days | See Table 3.1 RME EPA, 2004 EPA, 2004 EPA, 2004 EPA, 1991 EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT |
| | Maintenance Worker | Adult | Total Soil | CS SA SSAF DABS CF1 EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor 1 Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 3,300 0.2 Chemical Specific 0.000001 52 25 70 25,550 9,125 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days days | See Table 3.1 RME EPA, 2004 EPA, 2004, (3) EPA, 2004 -- (1) | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT |
| | Trespasser/Visitor | Adult | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 5,700 0.07 Chemical Specific 0.000001 52 24 70 25,550 8,760 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days days | See Table 3.1 RME EPA, 2004 EPA, 2004 EPA, 2004 -- (1) EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF1 x EF x ED x 1/BW x 1/AT |
| | Trespasser/Visitor | Youth | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) | See Table 3.1 RME 4,200 0.1 Chemical Specific 0.000001 52 10 45 25,550 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days | See Table 3.1 RME EPA, 2004 (4) EPA, 2004, (5) EPA, 2004 -- (1) (2) EPA, 2000 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF1 x EF x ED x 1/BW x 1/AT |

TABLE 4.1.RME
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|--|--|--|--|---|---|
| Dermal | Trespasser/Visitor | Child | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1 RME 2,800 0.2 Chemical Specific 0.000001 52 6 15 25,550 2,190 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days days | See Table 3.1 RME EPA, 2004 EPA, 2004 EPA, 2004 -- (1) EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF1 x EF x ED x 1/BW x 1/AT |

Notes:

(1) Professional judgment assuming 1 day per week for 52 weeks.

(2) Professional judgment assuming adolescents from 7 to 16 years of age.

(3) SSAF based on adherence factor for (Geometric Mean) utility workers - Exhibit 3-3 of RAGS Part E.

(4) SA is the total of the head, hands, forearms and lower legs for the 7 through 16 year olds.

(5) SSAF is the geometric mean weighted soil adherence to legs for Rugby from EPA, 2004, Exhibit 3-3.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

EPA, 2000: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. www.epa.gov/region4/waste/oftecser/healthbul.htm.

EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

TABLE 4.1.CTE
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 CENTRAL TENDANCY EXPOSURE
 Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|---|---|--|--|---|---|
| Ingestion | Resident | Child | Total Soil | CS IR-S EF ED CF BW AT-C AT-N | Chemical Concentration in Soil Ingestion Rate of Soil Exposure Frequency Exposure Duration Conversion Factor Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1.CTE 100 234 6 0.000001 15 25,550 2,190 | mg/kg mg/day days/year years kg/mg kg days days | See Table 3.1.CTE EPA, 1993 EPA, 1993 EPA, 1991 -- EPA, 1991 EPA, 1989 EPA, 1989 | Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF x 1/BW x 1/AT |
| | Resident | Child/Adult | Total Soil | CS IR-Sa EDa BWA IR-Sc EDc BWC IR-S EF CF3 AT-C | Chemical Concentration in Soil Ingestion Rate of Soil-adult Exposure Duration - adult Body Weight - adult Ingestion Rate of Soil-child Exposure Duration - child Body Weight - child Ingestion Rate of Soil-adjusted Exposure Frequency Conversion Factor 3 Averaging Time (Cancer) | See Table 3.1.RME 50 9 70 100 6 15 46 234 0.000001 25,550 | mg/kg mg/day years kg mg/day years kg mg-year/kg-day days/year kg/mg days | See Table 3.1.RME EPA, 1991 EPA, 1991 EPA, 1991 EPA, 1991 EPA, 1991 EPA, 1991 -- EPA, 1991 -- EPA, 1989 | Carcinogenic Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x CF x 1/AT $IR-S = (EDc * IR-Sc / BWC) + (EDa * IR-Sa / BWA)$ |
| Dermal | Resident | Child | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1.CTE 2,800 0.04 chem specific 0.000001 234 6 15 25,550 2,190 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days days | See Table 3.1.CTE EPA, 2004 EPA, 2004 EPA, 2004 -- EPA, 1993 EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT |

TABLE 4.1.CTE
VALUES USED FOR DAILY INTAKE CALCULATIONS
CENTRAL TENDANCY EXPOSURE
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|---|---|---|---|---|---|
| | | Child/Adult | Total Soil | CS SAc SSAFC EDc BWc SAA SSAFA EDA BWA SA DABS CF3 EF AT-C | Chemical Concentration in Soil Skin Surface Area - child Soil to Skin Adherence Factor - child Exposure Duration - child Body Weight - child Skin Surface Area - adult Soil to Skin Adherence Factor-adult Exposure Duration -adult Body Weight - adult Skin Surface Area -adjusted Dermal Absorption Factor Solids Conversion Factor 3 Exposure Frequency Averaging Time (Cancer) | See Table 3.1.RME 2,800 0.04 6 15 5,700 0.01 9 70 52 chem specific 0.000001 350 25,550 | mg/kg cm ² mg/cm ² -day years kg cm ² mg/cm ² -day years kg cm ² -year/kg-day -- kg/mg days/year days | See Table 3.1.RME EPA, 2004 EPA, 2004 EPA, 1991 EPA, 1991 EPA, 2004 EPA, 2004 EPA, 1991 EPA, 1991 EPA, 1991 EPA, 2004 -- -- EPA, 1991 EPA, 1989 | Carcinogenic CDI (mg/kg-day) = CS x SA x DABS x CF3 x EF x 1/AT SA = ((EDc * SAc/BWc)*SSAFC) + ((EDA * SAA/BWA)*SSAFA) |
| Inhalation | Resident | Child | Total Soil | CS CA PEF VF ET EF ED CF AT-C AT-N | Chemical Concentration in Soil Chemical Concentration in Air Particulate Emission Factor Volatilization Factor for volatile constituents Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1.CTE calc 1.36E+09 calc 24 234 6 1/24 25,550 2,190 | mg/kg mg/m ³ m ³ /kg m ³ /kg hour/day days/year years day/hr days days | EPA, 2004 calc EPA, 2002 EPA, 2002 -- EPA, 1991 EPA, 1991 -- EPA, 1989 EPA, 1989 | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | Child/Adult | Total Soil | CS CA PEF VF ET EF ED CF AT-C | Chemical Concentration in Soil Chemical Concentration in Air Particulate Emission Factor Volatilization Factor for volatile constituents Exposure Time Exposure Frequency Exposure Duration Conversion Factor 1 Averaging Time (Cancer) | See Table 3.1.CTE calc 1.36E+09 calc 24 234 30 1/24 25,550 | mg/kg mg/m ³ m ³ /kg m ³ /kg hr/day days/year years day/hr days | EPA, 1991 calc EPA, 2002 EPA, 2002 EPA, 2009 EPA, 1991 EPA, 2002 -- EPA, 1989 | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |

TABLE 4.1.CTE
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 CENTRAL TENDANCY EXPOSURE
 Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake Equation/ Model Name |
|----------------|---------------------|--------------|----------------|----------------|----------------------|-------|-------|-------------------------|--------------------------------|
| | | | | | | | | | |

Sources:

- EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
- EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
- EPA, 1993: Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.
- EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

TABLE 4.2.RME
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|----------------|---------------------------------|-------------------|----------------|---------------------|--|
| Ingestion | Construction Worker | Adult | Total Soil | CS | Chemical Concentration in Soil | See Table 3.1.RME | mg/kg | See Table 3.1.RME | Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF x 1/BW x 1/AT |
| | | | | IR-S | Ingestion Rate of Soil | 480 | mg/day | EPA, 1991 | |
| | | | | EF | Exposure Frequency | 250 | days/year | EPA, 1991 | |
| | | | | ED | Exposure Duration | 1 | years | EPA, 1991 | |
| | | | | CF | Conversion Factor | 0.000001 | kg/mg | -- | |
| | | | | BW | Body Weight | 70 | kg | EPA, 1991 | |
| | Resident | Adult | Total Soil | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF x 1/BW x 1/AT |
| | | | | AT-N | Averaging Time (Non-Cancer) | 365 | days | EPA, 1989 | |
| | | | | CS | Chemical Concentration in Soil | See Table 3.1.RME | mg/kg | See Table 3.1.RME | |
| | | | | IR-S | Ingestion Rate of Soil | 100 | mg/day | EPA, 1991 | |
| | | | | EF | Exposure Frequency | 350 | days/year | EPA, 1991 | |
| | | | | ED | Exposure Duration | 24 | years | EPA, 1991 | |
| | Child | Child | Total Soil | CF | Conversion Factor | 0.000001 | kg/mg | -- | Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x ED x CF x 1/BW x 1/AT |
| | | | | BW | Body Weight | 70 | kg | EPA, 1991 | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 8,760 | days | EPA, 1989 | |
| | | | | CS | Chemical Concentration in Soil | See Table 3.1.RME | mg/kg | See Table 3.1.RME | |
| | | | | IR-Sa | Ingestion Rate of Soil-adult | 200 | mg/day | EPA, 1991 | |
| Resident | Child/Adult | Child/Adult | Total Soil | EDA | Exposure Duration adult | 350 | days/year | EPA, 1991 | Carcinogenic Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR-S x EF x CF x 1/AT IR-S = (EDc * IR-Sc/ BWc) + (EDA * IR-Sa/BWa) |
| | | | | BWa | Body Weight adult | 6 | years | EPA, 1991 | |
| | | | | IR-Sc | Ingestion Rate of Soil-child | 200 | kg | EPA, 1991 | |
| | | | | EDc | Exposure Duration child | 15 | mg/day | EPA, 1991 | |
| | | | | BWc | Body Weight child | 6 | years | EPA, 1991 | |
| | | | | IR-S | Ingestion Rate of Soil-adjusted | 114.29 | kg | EPA, 1991 | |
| | | | | EF | Exposure Frequency | 350 | mg-year/kg-day | EPA, 1991 | |
| | | | | CF3 | Conversion Factor 3 | 0.000001 | days/year | EPA, 1991 | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | kg/mg | EPA, 1989 | |
| | | | | | | | days | | |

TABLE 4.2.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|--|--|---|---|---|--|
| Dermal | Construction Worker | Adult | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1.RME 3,300 0.2 chem specific 0.000001 250 1 70 25,550 365 | mg/kg cm ² mg/cm ² -day -- kg/mg days/years years kg days days | See Table 3.1.RME EPA, 2004 EPA, 2004 EPA, 2004 -- EPA, 1991 EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT |
| | Resident | Adult | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1.RME 5,700 0.07 chem specific 0.000001 350 24 24 25,550 8,760 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days days | See Table 3.1.RME EPA, 2004 EPA, 2004 EPA, 2004 -- EPA, 1991 EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT |
| Dermal (cont.) | Resident | Child | Total Soil | CS SA SSAF DABS CF EF ED BW AT-C AT-N | Chemical Concentration in Soil Skin Surface Area Available for Contact Soil to Skin Adherence Factor Dermal Absorption Factor Solids Conversion Factor Exposure Frequency Exposure Duration Body Weight Averaging Time (Cancer) Averaging Time (Non-Cancer) | See Table 3.1.RME 2,800 0.2 chem specific 0.000001 350 6 15 25,550 2,190 | mg/kg cm ² mg/cm ² -day -- kg/mg days/year years kg days days | See Table 3.1.RME EPA, 2004 EPA, 2004 EPA, 2004 -- EPA, 1991 EPA, 1991 EPA, 1991 EPA, 1989 EPA, 1989 | CDI (mg/kg-day) = CS x SA x SSAF x DABS x CF x EF x ED x 1/BW x 1/AT |

TABLE 4.2.RME
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|-----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Total Soil |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|----------------|---|---|--|---|---|---|
| | | Child/Adult | Total Soil | CS SAc SSAFC EDc BWc SAA SSAFA EDA BWA SA DABS CF3 EF AT-C | Chemical Concentration in Soil Skin Surface Area child Soil to Skin Adherence Factor child Exposure Duration child Body Weight child Skin Surface Area adult Soil to Skin Adherence Factor-adult Exposure Duration adult Body Weight adult Skin Surface Area adjusted Dermal Absorption Factor Solids Conversion Factor 3 Exposure Frequency Averaging Time (Cancer) | See Table 3.1.RME 2,800 0.2 6 15 5,700 0.07 24 70 361 chem specific 0.000001 350 25,550 | mg/kg cm ² mg/cm ² -day years kg cm ² mg/cm ² -day years kg cm ² -year/kg-day -- kg/mg days/year days | See Table 3.1.RME EPA, 2004 EPA, 2004 EPA, 1991 EPA, 1991 EPA, 2004 EPA, 2004 EPA, 1991 EPA, 1991 --- EPA, 2004 -- EPA, 1991 EPA, 1989 | Carcinogenic CDI (mg/kg-day) = CS x SA x DABS x CF3 x EF x 1/AT SA = ((EDc * SAc/BWc)*SSAFC) + '((EDA * SAA/BWa)*SSAFA) |

Notes:

- (1) Professional judgment assuming 1 day per week for 52 weeks.
- (2) Professional judgment assuming adolescents from 7 to 16 years of age.
- (3) SSAF based on adherence factor for (Geometric Mean) utility workers - Exhibit 3-3 of RAGS Part E.
- (4) SA is the total of the head, hands, forearms and lower legs for the 7 through 16 year olds.
- (5) SSAF is the geometric mean weighted soil adherence to legs for Rugby from EPA, 2004, Exhibit 3-3.

Sources:

- EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
 EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.
 EPA, 2000: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. www.epa.gov/region4/waste/oftecser/healtbul.htm.
 EPA, 2004: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

TABLE 4.3.RME
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Medium: Total Soil |
| Exposure Medium: Air |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake Equation/Model Name |
|--------------------|---------------------|--------------------|----------------|----------------|---|-------------------|--------------------|----------------------|---|
| Industrial Worker | Adult | Emisions from Soil | | CS | Chemical Concentration in Soil | See Table 3.2 RME | mg/kg | See Table 3.2 RME | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | | | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 8 | hour/day | EPA, 1991 | |
| | | | | EF | Exposure Frequency | 250 | days/year | EPA, 1991 | |
| | | | | ED | Exposure Duration | 25 | years | EPA, 1991 | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 9,125 | days | EPA, 1989 | |
| Maintenance Worker | Adult | Emisions from Soil | | CS | Chemical Concentration in Soil | See Table 3.2 RME | mg/kg | See Table 3.2 RME | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | | | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 8 | hour/day | EPA, 1991 | |
| | | | | EF | Exposure Frequency | 52 | days/year | (1) | |
| | | | | ED | Exposure Duration | 25 | years | EPA, 1991 | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 9,125 | days | EPA, 1989 | |
| Trespasser/Visitor | Adult | Emisions from Soil | | CS | Chemical Concentration in Soil | See Table 3.2 RME | mg/kg | See Table 3.2 RME | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | | | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 2 | hour/day | (4) | |
| | | | | EF | Exposure Frequency | 52 | days/year | (2) | |
| | | | | ED | Exposure Duration | 24 | years | EPA, 1991 | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 8,760 | days | EPA, 1989 | |
| Trespasser/Visitor | Youth | Emisions from Soil | | CS | Chemical Concentration in Soil | See Table 3.2 RME | mg/kg | See Table 3.2 RME | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | | | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 2 | hour/day | (4) | |
| | | | | EF | Exposure Frequency | 52 | days/year | (2) | |
| | | | | ED | Exposure Duration | 10 | years | (2) | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 3,650 | days | EPA, 1989 | |

TABLE 4.3.RME
 VALUES USED FOR DAILY INTAKE CALCULATIONS
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Medium: Total Soil |
| Exposure Medium: Air |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/ Reference | Intake Equation/Model Name |
|----------------|---------------------|--------------|--------------------|----------------|---|-------------------|--------------------|----------------------|---|
| | | Child | Emisions from Soil | CS | Chemical Concentration in Soil | See Table 3.2 RME | mg/kg | See Table 3.2 RME | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | | | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 2 | hour/day | (4) | |
| | | | | EF | Exposure Frequency | 52 | days/year | (1) | |
| | | | | ED | Exposure Duration | 6 | years | EPA, 2000 | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 2,190 | days | EPA, 1989 | |

Notes:

- (1) Professional judgment assuming maintenance activities performed 1 day/week in industrial area.
- (2) Professional judgment assuming 2 hours per day.
- (3) Professional judgment assuming trespasser/visitor in industrial area of site 1 day per week for 52 weeks.
- (4) Professional judgment assuming adolescents from 7 to 16 years of age.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2000: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. www.epa.gov/region4/waste/oftecser/healtbul.htm.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 4.4.RME
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|----------------------------|
| Scenario Timeframe: Future |
| Medium: Total Soil |
| Exposure Medium: Air |

| Exposure Route | Receptor Population | Receptor Age | Exposure Point | Parameter Code | Parameter Definition | Value | Units | Rationale/Reference | Intake Equation/Model Name |
|----------------|---------------------|---|----------------------|----------------|---|-----------|--------------------|---------------------|---|
| Inhalation | Resident | Adult | Emissions from Soil* | CS | Chemical Concentration in Soil | See Table | mg/kg | See Table | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | | | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 24 | hour/day | -- | |
| | | | | EF | Exposure Frequency | 350 | days/year | EPA, 1991 | |
| | | | | ED | Exposure Duration | 24 | years | EPA, 1991 | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | Child | Emissions from Soil* | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | AT-N | Averaging Time (Non-Cancer) | 8,760 | days | EPA, 1989 | |
| | | | | CS | Chemical Concentration in Soil | See Table | mg/kg | See Table | |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | Child/Adult | Emissions from Soil* | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 24 | hour/day | -- | |
| | | | | EF | Exposure Frequency | 350 | days/year | EPA, 1991 | |
| | | | | ED | Exposure Duration | 6 | years | EPA, 1991 | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 2,190 | days | EPA, 1989 | |
| | | | | CS | Chemical Concentration in Soil | See Table | mg/kg | See Table | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (mg/m ³) = CS (1/PEF + 1/VF) |
| | | | | CA | Chemical Concentration in Air | calc | mg/m ³ | calc | |
| | | | | PEF | Particulate Emission Factor | 1.36E+09 | m ³ /kg | EPA, 2002 | |
| | | | | VF | Volatilization Factor for volatile constituents | calc | m ³ /kg | EPA, 2002 | |
| | | | | ET | Exposure Time | 24 | hr/day | EPA, 2009 | |
| | | | | EF | Exposure Frequency | 350 | days/year | EPA, 1991 | |
| | | | | ED | Exposure Duration | 30 | years | EPA, 2002 | |
| | | | | CF | Conversion Factor 1 | 1/24 | day/hr | -- | |
| | | | | AT-C | Averaging Time (Cancer) | 25,550 | days | EPA, 1989 | |
| | | | | AT-N | Averaging Time (Non-Cancer) | 365 | days | EPA, 1989 | |
| | Construction Worker | Adult | Emissions from Soil* | CS | Chemical Concentration in Soil | See Table | mg/kg | See Table | Exposure Concentration (EC) (mg/m ³) = CA x ET x EF x ED x CF x 1/AT CA (ma/m ³) = CS (1/PEF + 1/VF) |
| | CA | Chemical Concentration in Air | | calc | mg/m ³ | calc | | | |
| | PEF | Particulate Emission Factor | | 1.36E+09 | m ³ /kg | EPA, 2002 | | | |
| | VF | Volatilization Factor for volatile constituents | | calc | m ³ /kg | EPA, 2002 | | | |
| | ET | Exposure Time | | 8 | hour/day | EPA, 1991 | | | |
| | EF | Exposure Frequency | | 250 | days/year | EPA, 1991 | | | |
| | ED | Exposure Duration | | 1 | years | EPA, 2002 | | | |
| | CF | Conversion Factor 1 | | 1/24 | day/hr | -- | | | |
| | AT-C | Averaging Time (Cancer) | | 25,550 | days | EPA, 1989 | | | |
| | AT-N | Averaging Time (Non-Cancer) | | 365 | days | EPA, 1989 | | | |

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1991: Risk Assessment Guidance for Superfund. Vol.1: Human Health Evaluation Manual - Supplemental Guidance, Standard Default Exposure Factors. Interim Final. OSWER Directive 9285.6-03.

EPA, 2000: Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins. www.epa.gov/region4/waste/oftecser/healtbul.htm.

EPA, 2002: Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
Site 16, MCAS Cherry Point

| Chemical of Potential Concern | Chronic/Subchronic | Oral RfD | | Oral Absorption Efficiency for Dermal (1) | Absorbed RfD for Dermal (2) | | Primary Target Organ(s) | Combined Uncertainty/Modifying Factors | RfD:Target Organ(s) | |
|-------------------------------|--------------------|----------|-----------|---|-----------------------------|-----------|-------------------------------------|--|---------------------|------------------------|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Benzo(a)anthracene | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(a)pyrene | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(b)fluoranthene | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Benzo(k)fluoranthene | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chrysene | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Dibenz(a,h)anthracene | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Indeno(1,2,3-cd)pyrene | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Aroclor-1254 | Chronic | 2.0E-05 | mg/kg-day | 100% | 2.0E-05 | mg/kg-day | Finger nails, Eyes Immune system | 300 / 1 100 | IRIS HEAST | 1/12/2011 7/31/1997 |
| | Subchronic | 5.0E-05 | mg/kg-day | 100% | 5.0E-05 | mg/kg-day | | | | |
| Aroclor-1260 | Chronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Dieldrin | Chronic | 5.0E-05 | mg/kg-day | generally > 50% | 5.0E-05 | mg/kg-day | Liver | 100/1 | IRIS | 1/12/2011 |
| | Subchronic | 5.0E-05 | mg/kg-day | generally > 50% | 5.0E-05 | mg/kg-day | Liver | 100 | HEAST | 7/31/1997 |
| Aluminum | Chronic | 1.0E+00 | mg/kg-day | 100% | 1.0E+00 | mg/kg-day | Neurotoxicity | 100 / 1 | PPRTV | 10/23/2006 |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Antimony | Chronic | 4.0E-04 | mg/kg-day | 15% | 6.0E-05 | mg/kg-day | Blood | 1000 / 1 | IRIS | 1/12/2011 |
| | Subchronic | 4.0E-04 | mg/kg-day | 15% | 6.0E-05 | mg/kg-day | Blood, Lifespan | 1000 | PPRTV | 11/11/2010 |
| Arsenic | Chronic | 3.0E-04 | mg/kg-day | 95% | 3.0E-04 | mg/kg-day | Skin, Vascular | 3 / 1 | IRIS | 1/12/2011 |
| | Subchronic | 3.0E-04 | mg/kg-day | 95% | 3.0E-04 | mg/kg-day | Skin | 3 | HEAST | 7/31/1997 |
| Barium | Chronic | 2.0E-01 | mg/kg-day | 7% | 1.4E-02 | mg/kg-day | Nephropathy | 300 | IRIS | 11/11/2010 |
| | Subchronic | 7.0E-02 | mg/kg-day | 7% | 4.9E-03 | mg/kg-day | Increased blood | 3 | HEAST | 7/31/1997 |
| Cadmium | Chronic | 1.0E-03 | mg/kg-day | 3% | 2.5E-05 | mg/kg-day | Significant proteinuria | 10 / 1 | IRIS | 1/12/2011 |
| | Subchronic | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| Chromium | Chronic | 3.0E-03 | mg/kg-day | 2.5% | 7.5E-05 | mg/kg-day | NOE | 300 / 3 | IRIS | 11/18/2010 |
| | Subchronic | 2.0E-02 | mg/kg-day | 2.5% | 5.0E-04 | mg/kg-day | NOE | 100 | HEAST | 7/31/1997 |
| Cobalt | Chronic | 3.0E-04 | mg/kg-day | 100% | 3.0E-04 | mg/kg-day | Iodine uptake | 3000 / 1 | PPRTV | 8/25/2008 |
| | Subchronic | 3.0E-03 | mg/kg-day | 100% | 3.0E-03 | mg/kg-day | Iodine uptake | 300 | PPRTV | 8/25/2008 |

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
Site 16, MCAS Cherry Point

| Chemical of Potential Concern | Chronic/Subchronic | Oral RfD | | Oral Absorption Efficiency for Dermal (1) | Absorbed RfD for Dermal (2) | | Primary Target Organ(s) | Combined Uncertainty/Modifying Factors | RfD:Target Organ(s) | |
|-------------------------------|--------------------|--------------------|------------------------|---|-----------------------------|------------------------|--------------------------------------|--|---------------------|--------------------------|
| | | Value | Units | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Copper | Chronic Subchronic | 4.0E-02 4.0E-02 | mg/kg-day mg/kg-day | >50% >50% | 4.0E-02 4.0E-02 | mg/kg-day mg/kg-day | Gastrointestinal Gastrointestinal | NA NA | HEAST HEAST | 7/31/1997 7/31/1997 |
| Iron | Chronic Subchronic | 7.0E-01 7.0E-01 | mg/kg-day mg/kg-day | 100% 100% | 7.0E-01 7.0E-01 | mg/kg-day mg/kg-day | Gastrointestinal Gastrointestinal | 1.5 1.5 | PPRTV PPRTV | 11/11/2010 11/11/2010 |
| Lead | Chronic Subchronic | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA |
| Manganese | Chronic Subchronic | 1.4E-01 1.4E-01 | mg/kg-day mg/kg-day | 4% 4% | 5.6E-03 5.6E-03 | mg/kg-day mg/kg-day | CNS CNS | 1 / 1 1 | IRIS HEAST | 11/18/2010 7/31/1997 |
| Mercury | Chronic Subchronic | 3.0E-04 3.0E-03 | mg/kg-day mg/kg-day | 7% 7% | 2.1E-05 2.1E-04 | mg/kg-day mg/kg-day | Immune system Immune system | 1000 / 1 100 | IRIS HEAST | 11/18/2010 7/31/1997 |
| Thallium | Chronic Subchronic | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA | NA NA |
| Vanadium | Chronic Subchronic | 5.0E-03 7.0E-03 | mg/kg-day mg/kg-day | 2.6% 2.6% | 1.3E-04 1.8E-04 | mg/kg-day mg/kg-day | Hair Cystine Whole body | 100 / 1 100 | IRIS HEAST | 11/18/2010 7/31/1997 |
| Zinc | Chronic Subchronic | 3.0E-01 3.0E-01 | mg/kg-day mg/kg-day | 100% 100% | 3.0E-01 3.0E-01 | mg/kg-day mg/kg-day | Blood Blood | 3 / 1 3 | IRIS HEAST | 11/18/2010 7/31/1997 |

Footnote Instructions:

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health

Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment (Interim).

Section 4.2 and Exhibit 4-1. USEPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%.

Constituents that do not have oral absorption efficiencies reported on this table

were assumed to have an oral absorption efficiency of 100%.

Definitions: HEAST = Health Effects Assessment Summary Tables

IRIS = Integrated Risk Information System

NA = Not available/not applicable

PPRTV = Provisional Peer Reviewed Toxicity Values

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
Site 16, MCAS Cherry Point

| Chemical of Potential Concern | Chronic/Subchronic | Inhalation RfC | | Primary Target Organ(s) | Combined Uncertainty/Modifying Factors | RfC : Target Organ(s) | |
|-------------------------------|--------------------|----------------|-------------------|--|--|-----------------------|----------------------|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| Benzo(a)anthracene | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Benzo(a)pyrene | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Benzo(b)fluoranthene | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Benzo(k)fluroanthene | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Chrysene | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Dibenz(a,h)anthracene | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Indeno(1,2,3-cd)pyrene | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Aroclor-1254 | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Aroclor-1260 | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Dieldrin | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Aluminum | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Antimony | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Arsenic | Chronic | 0.000015 | mg/m ³ | Developmental, Cardiovascular System, Nervous System | | CalEPA | 12/18/2008 |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Barium | Chronic | 5.0E-04 | mg/m ³ | Increased blood pressure Fetotoxicity | 3 | HEAST | 7/31/1997 |
| | Subchronic | 5.0E-03 | mg/m ³ | | 100 | HEAST | 7/31/1997 |
| Cadmium (diet) | Chronic | 0.00001 | mg/m ³ | NA | NA | ATSDR | 9/1/2008 |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Chromium | Chronic | 0.0001 | mg/m ³ | Respiratory | 300 / 1 | IRIS | 4/19/2010 |

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
Site 16, MCAS Cherry Point

| Chemical of Potential Concern | Chronic/Subchronic | Inhalation RfC | | Primary Target Organ(s) | Combined Uncertainty/Modifying Factors | RfC : Target Organ(s) | |
|-------------------------------|--------------------|----------------|-------|-------------------------|--|-----------------------|----------------------|
| | | Value | Units | | | Source(s) | Date(s) (MM/DD/YYYY) |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Cobalt | Chronic | 0.000006 | mg/m3 | Respiratory | 300 / 1 | PPRTV | 8/25/2008 |
| | Subchronic | 0.00002 | mg/m3 | Respiratory | 100 | PPRTV | 8/25/2008 |
| Copper | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Iron | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Lead | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Manganese | Chronic | 5.0E-05 | mg/m3 | Neurological | 1000 / 1 | IRIS | 11/18/2010 |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Mercury | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Thallium | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Vanadium | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |
| Zinc | Chronic | NA | NA | NA | NA | NA | NA |
| | Subchronic | NA | NA | NA | NA | NA | NA |

Definitions:

ATSDR = Agency for Toxic Substances and Disease Registry

CalEPA = California Environmental Protection Agency

IRIS = Integrated Risk Information System

NA = Not available/not applicable

PPRTV = Provisional Peer Reviewed Toxicity Values

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
Site 16, MCAS Cherry Point

| Chemical of Potential Concern | Oral Cancer Slope Factor | | Oral Absorption Efficiency for Dermal (1) | Absorbed Cancer Slope Factor for Dermal | | Weight of Evidence/Cancer Guideline Description | Oral CSF | |
|-------------------------------|--------------------------|---------------------------|--|---|---------------------------|---|------------|-------------------------|
| | Value | Units | | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Benzo(a)anthracene | 7.3E-01 | (mg/kg-day) ⁻¹ | 58-89% | 7.3E-01 | (mg/kg-day) ⁻¹ | B2 | ECAO (RSL) | 11/18/2010 |
| Benzo(a)pyrene | 7.3E+00 | (mg/kg-day) ⁻¹ | 58-89% | 7.3E+00 | (mg/kg-day) ⁻¹ | B2 | IRIS | 1/12/2011 |
| Benzo(b)fluoranthene | 7.3E-01 | (mg/kg-day) ⁻¹ | 58-89% | 7.3E-01 | (mg/kg-day) ⁻¹ | B2 | ECAO (RSL) | 11/18/2010 |
| Benzo(k)fluoranthene | 7.3E-02 | (mg/kg-day) ⁻¹ | 58-89% | 7.3E-02 | (mg/kg-day) ⁻¹ | B2 | ECAO (RSL) | 11/18/2010 |
| Chrysene | 7.3E-03 | (mg/kg-day) ⁻¹ | 58-89% | 7.3E-02 | (mg/kg-day) ⁻¹ | B2 | ECAO (RSL) | 11/18/2010 |
| Dibenz(a,h)anthracene | 7.3E+00 | (mg/kg-day) ⁻¹ | 58-89% | 7.3E+00 | (mg/kg-day) ⁻¹ | B2 | ECAO (RSL) | 11/18/2010 |
| Indeno(1,2,3-cd)pyrene | 7.3E-01 | (mg/kg-day) ⁻¹ | 58-89% | 7.3E-01 | (mg/kg-day) ⁻¹ | B2 | ECAO (RSL) | 11/18/2010 |
| Aroclor-1254 | 2.0E+00 | (mg/kg-day)-1 | 100% | 2.0E+00 | (mg/kg-day)-1 | B2 | IRIS | 1/12/2011 |
| Aroclor-1260 | 2.0E+00 | (mg/kg-day)-1 | 100% | 2.0E+00 | (mg/kg-day)-1 | B2 | IRIS | 1/12/2011 |
| Dieldrin | 1.6E+01 | (mg/kg-day) ⁻¹ | generally >50% | 1.6E+01 | (mg/kg-day) ⁻¹ | B2 | IRIS | 1/12/2011 |
| Aluminum | NA | NA | NA | NA | NA | NA | NA | NA |
| Antimony | NA | NA | NA | NA | NA | NA | NA | NA |
| Arsenic | 1.5E+00 | (mg/kg-day) ⁻¹ | 95% | 1.5E+00 | (mg/kg-day) ⁻¹ | A | IRIS | 1/12/2011 |
| Barium | NA | NA | NA | NA | NA | NA | NA | NA |
| Cadmium | NA | NA | NA | NA | NA | NA | NA | NA |
| Chromium | 5.0E-01 | (mg/kg-day)-1 | 3% | 1.3E-02 | (mg/kg-day)-1 | D | New Jersey | 11/18/2010 |
| Cobalt | NA | NA | NA | NA | NA | NA | NA | NA |
| Copper | NA | NA | NA | NA | NA | NA | NA | NA |
| Iron | NA | NA | NA | NA | NA | NA | NA | NA |
| Lead | NA | NA | NA | NA | NA | NA | NA | NA |
| Manganese | NA | NA | NA | NA | NA | NA | NA | NA |
| Mercury | NA | NA | NA | NA | NA | NA | NA | NA |
| Thallium | NA | NA | NA | NA | NA | NA | NA | NA |
| Vanadium | NA | NA | NA | NA | NA | NA | NA | NA |
| Zinc | NA | NA | NA | NA | NA | NA | NA | NA |

(1) Source: Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment(Interim). Section 4.2 and Exhibit 4-1. USEPA recommends that the oral RfD should not be adjusted to estimate the absorbed dose for compounds when the absorption efficiency is greater than 50%. Constituents that do not have oral absorption efficiencies reported on this table were assumed to have an oral absorption efficiency of 100%.

(2) See Risk Assessment text for the derivation of the "Absorbed CSF for Dermal"

(3) Toxicity values for hexavalent chromium were used to evaluate chromium

Definitions:
 ECAO = Environmental Criteria and Assessment Office
 IRIS = Integrated Risk Information System
 NA = Not available/not applicable
 RSL = As cited in EPA Regional Screening Level Table (December 22, 2009)

Weight of Evidence definitions:

Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in humans and cancer.

Group B1 chemicals (probable human carcinogens) are agents for which there is limited evidence of possible carcinogenicity in humans.

Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence in humans.

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
Site 16, MCAS Cherry Point

| Chemical of Potential Concern | Oral Cancer Slope Factor | | Oral Absorption Efficiency for Dermal (1) | Absorbed Cancer Slope Factor for Dermal | | Weight of Evidence/ Cancer Guideline Description | Oral CSF | |
|-------------------------------------|--------------------------|-------|---|--|-------|--|-----------|-------------------------|
| | Value | Units | | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| | | | | | | | | |

Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data.

Group D chemicals (not classifiable as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.

Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity from human or animal studies, or both.

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
Site 16, MCAS Cherry Point

| Chemical of Potential Concern | Unit Risk | | Weight of Evidence/ Cancer Guideline Description | Unit Risk | |
|-------------------------------|-----------|-----------|---|--------------|-------------------------|
| | Value | Units | | Source(s) | Date(s) (MM/DD/YYYY) |
| Dieldrin | 4.6E-03 | (ug/m3)-1 | B2 | IRIS | 1/12/2011 |
| Benzo(a)anthracene | 1.1E-04 | (ug/m3)-1 | 2A | CalEPA (RSL) | 11/18/2010 |
| Benzo(a)pyrene | 1.1E-03 | (ug/m3)-1 | 2A | CalEPA (RSL) | 11/18/2010 |
| Benzo(b)fluoranthene | 1.1E-04 | (ug/m3)-1 | 2B | CalEPA (RSL) | 11/18/2010 |
| Benzo(k)fluoranthene | 1.1E-04 | (ug/m3)-1 | 2B | CalEPA (RSL) | 11/18/2010 |
| Chrysene | 1.1E-05 | (ug/m3)-1 | B2 | CalEPA (RSL) | 11/18/2010 |
| Dibenz(a,h)anthracene | 1.2E-03 | (ug/m3)-1 | B2 | CalEPA (RSL) | 11/18/2010 |
| Indeno(1,2,3-cd)pyrene | 1.1E-04 | (ug/m3)-1 | B2 | CalEPA (RSL) | 11/18/2010 |
| Aroclor-1254 | 5.7E-04 | (ug/m3)-1 | B2 | IRIS | 1/12/2011 |
| Aroclor-1260 | 5.7E-04 | (ug/m3)-1 | B2 | IRIS | 1/12/2011 |
| Aluminum | NA | NA | NA | NA | NA |
| Antimony | NA | NA | NA | NA | NA |
| Arsenic | 4.3E-03 | (ug/m3)-1 | A | IRIS | 1/12/2011 |
| Barium | NA | NA | NA | NA | NA |
| Cadmium | 1.8E-03 | (ug/m3)-1 | B1 | IRIS | 1/12/2011 |
| Chromium | 8.4E-02 | (ug/m3)-1 | A | RSL | 11/18/2010 |
| Cobalt | 9.0E-03 | (ug/m3)-1 | B1 | PPRTV (RSL) | 11/18/2010 |
| Copper | NA | NA | NA | NA | NA |
| Iron | NA | NA | NA | NA | NA |
| Lead | NA | NA | NA | NA | NA |
| Manganese | NA | NA | NA | NA | NA |
| Mercury | NA | NA | NA | NA | NA |
| Thallium | NA | NA | NA | NA | NA |
| Vanadium | NA | NA | NA | NA | NA |
| Zinc | NA | NA | NA | NA | NA |

Definitions:

CalEPA = California Environmental Protection Agency

IRIS = Integrated Risk Information System

NA = Not available/not applicable

RSL = As cited in EPA Regional Screening Level Table (December 22, 2009)

Weight of Evidence definitions:

Group A chemicals (known human carcinogens) are agents for which there is sufficient evidence to support the causal association between exposure to the agents in I Group B1 chemicals (probable human carcinogens) are agents for which there is limited evidence of possible carcinogenicity in humans

Group B2 chemicals (probable human carcinogens) are agents for which there is sufficient evidence of carcinogenicity in animals but inadequate or a lack of evidence

Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals and inadequate or a lack of human data

Group D chemicals (not classifiable as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available

Group E chemicals (evidence of noncarcinogenicity in humans) are agents for which there is no evidence of carcinogenicity from human or animal studies, or both

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Current/Future |
| Receptor Population: Industrial Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | |
|------------|-----------------|----------------|--------------------------------|-------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|--------------------------------|-------------------------------|-----------|---------|-----------------|---------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | 5.6E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 4.1E-08 | 1.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 7.8E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 5.7E-07 | 2.2E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 1.4E-07 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.1E-07 | 4.0E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 1.2E-07 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 8.6E-09 | 3.3E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.6E-01 | mg/kg | 9.1E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 6.6E-10 | 2.5E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 1.7E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.2E-07 | 4.7E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 4.2E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 3.0E-08 | 1.2E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 4.6E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 9.3E-08 | 1.3E-07 | mg/kg/day | 2.0E-05 | mg/kg/day | 6.5E-03 |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 4.7E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 9.4E-08 | 1.3E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 5.0E-09 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 8.0E-08 | 1.4E-08 | mg/kg/day | 5.0E-05 | mg/kg/day | 2.8E-04 |
| | | | | Aluminum | 1.3E+04 | mg/kg | 4.7E-03 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.3E-02 | mg/kg/day | 1.0E+00 | mg/kg/day | 1.3E-02 |
| | | | | Antimony | 2.4E+00 | mg/kg | 8.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.4E-06 | mg/kg/day | 4.0E-04 | mg/kg/day | 5.9E-03 |
| | | | | Arsenic | 2.2E+01 | mg/kg | 7.7E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 1.1E-05 | 2.1E-05 | mg/kg/day | 3.0E-04 | mg/kg/day | 7.1E-02 |
| | | | | Barium | 1.2E+02 | mg/kg | 4.2E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.2E-04 | mg/kg/day | 2.0E-01 | mg/kg/day | 5.9E-04 |
| | | | | Cadmium | 7.1E+00 | mg/kg | 2.5E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.0E-06 | mg/kg/day | 1.0E-03 | mg/kg/day | 7.0E-03 |
| | | | | Chromium | 2.4E+01 | mg/kg | 8.4E-06 | mg/kg/day | 5.0E-01 | 1/mg/kg-day | 4.2E-06 | 2.3E-05 | mg/kg/day | 3.0E-03 | mg/kg/day | 7.8E-03 |
| | | | | Cobalt | 2.2E+00 | mg/kg | 7.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.1E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 7.1E-03 |
| | | | | Copper | 3.5E+01 | mg/kg | 1.2E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.4E-05 | mg/kg/day | 4.0E-02 | mg/kg/day | 8.5E-04 |
| | | | | Iron | 1.1E+04 | mg/kg | 3.9E-03 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.1E-02 | mg/kg/day | 7.0E-01 | mg/kg/day | 1.6E-02 |
| | | | | Lead | 1.5E+02 | mg/kg | 5.2E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.5E-04 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Manganese | 1.0E+02 | mg/kg | 3.6E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.0E-04 | mg/kg/day | 1.4E-01 | mg/kg/day | 7.2E-04 |
| | | | | Mercury | 3.7E+00 | mg/kg | 1.3E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.6E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.2E-02 |
| | | | | Thallium | 1.2E+00 | mg/kg | 4.2E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.2E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Vanadium | 3.7E+01 | mg/kg | 1.3E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.7E-05 | mg/kg/day | 5.0E-03 | mg/kg/day | 7.3E-03 |
| | | | | Zinc | 8.1E+02 | mg/kg | 2.8E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.9E-04 | mg/kg/day | 3.0E-01 | mg/kg/day | 2.6E-03 |
| | | | Exp. Route | | | | | | | | 1.7E-05 | | | | | 1.6E-01 |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | 4.8E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 3.5E-08 | 1.4E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 6.7E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 4.9E-07 | 1.9E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 1.2E-07 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 9.0E-08 | 3.5E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 1.0E-07 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 7.4E-09 | 2.8E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.6E-01 | mg/kg | 8.4E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 6.1E-10 | 2.3E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 1.4E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.1E-07 | 4.1E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 3.9E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 2.8E-08 | 1.1E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 4.3E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 8.6E-08 | 1.2E-07 | mg/kg/day | 2.0E-05 | mg/kg/day | 6.0E-03 |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 3.1E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 6.2E-08 | 8.7E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 4.3E-09 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 6.9E-08 | 1.2E-08 | mg/kg/day | 5.0E-05 | mg/kg/day | 2.4E-04 |
| | | | | Aluminum | 1.3E+04 | mg/kg | 3.1E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 8.6E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 8.6E-04 |
| | | | | Antimony | 2.4E+00 | mg/kg | 5.6E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.6E-07 | mg/kg/day | 6.0E-05 | mg/kg/day | 2.6E-03 |
| | | | | Arsenic | 2.2E+01 | mg/kg | 1.5E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 2.3E-06 | 4.2E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.4E-02 |
| | | | | Barium | 1.2E+02 | mg/kg | 2.8E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.8E-06 | mg/kg/day | 1.4E-02 | mg/kg/day | 5.6E-04 |
| | | | | Cadmium | 7.1E+00 | mg/kg | 1.6E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.6E-08 | mg/kg/day | 2.5E-05 | mg/kg/day | 1.8E-03 |
| | | | | Chromium | 2.4E+01 | mg/kg | 5.5E-07 | mg/kg/day | 1.3E-02 | 1/mg/kg-day | 6.9E-09 | 1.5E-06 | mg/kg/day | 7.5E-05 | mg/kg/day | 2.1E-02 |

TABLE 7.1.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Current/Future |
| Receptor Population: Industrial Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | | | | |
|--------|-----------------|----------------|----------------|-------------------------------|---------------------|------------|-------------------------------|-----------|---------------|--|--------------------------------|-------------------------------|-----------|---------|-----------------|-----------|---------|-------|---------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 5.0E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.4E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 4.7E-04 | | | |
| | | | | Copper | 3.5E+01 | mg/kg | 8.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.2E-06 | mg/kg/day | 4.0E-02 | mg/kg/day | 5.6E-05 | | | |
| | | | | Iron | 1.1E+04 | mg/kg | 2.6E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.2E-04 | mg/kg/day | 7.0E-01 | mg/kg/day | 1.0E-03 | | | |
| | | | | Lead | 1.5E+02 | mg/kg | 3.4E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 9.6E-06 | mg/kg/day | NA | mg/kg/day | NA | | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 2.4E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.7E-06 | mg/kg/day | 5.6E-03 | mg/kg/day | 1.2E-03 | | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 8.5E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.4E-07 | mg/kg/day | 2.1E-05 | mg/kg/day | 1.1E-02 | | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 2.8E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.7E-08 | mg/kg/day | NA | mg/kg/day | NA | | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 8.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.4E-06 | mg/kg/day | 1.3E-04 | mg/kg/day | 1.9E-02 | | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 1.9E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.2E-05 | mg/kg/day | 3.0E-01 | mg/kg/day | 1.7E-04 | | | |
| | | | | Exp. Route | | | | | | | 3.3E-06 | | | | | 8.0E-02 | | | |
| | | | | Exposure Point Total | | | | | | | 2.0E-05 | | | | | 2.4E-01 | | | |
| | | | | Exposure Medium Total | | | | | | | 2.0E-05 | | | | | 2.4E-01 | | | |
| | | | | Air | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | 1.5E-09 | mg/kg/day | 8.4E+01 | mg/m³ | 1.2E-07 | 4.1E-09 | mg/kg/day | 1.0E-04 | mg/m³ | 4.1E-05 |
| | | | | Exp. Route | | | | | | | 1.2E-07 | | | | | 4.1E-05 | | | |
| | | | | Exposure Point Total | | | | | | | 1.2E-07 | | | | | 4.1E-05 | | | |
| | | | | Exposure Medium Total | | | | | | | 1.2E-07 | | | | | 4.1E-05 | | | |
| | | | | Soil Total | | | | | | | 2.0E-05 | | | | | 2.4E-01 | | | |
| | | | | | | | | | | Total of Receptor Risks Across All Media | 2.0E-05 | | | | | 2.4E-01 | | | |
| | | | | | | | | | | Total of Receptor Hazards Across All Media | 2.0E-05 | | | | | 2.4E-01 | | | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Maintenance Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | Non-Cancer Hazard Calculations | | | | | |
|------------|-----------------|----------------|------------------|-------------------------------|------------------------|---------|-------------------------------|-----------|---------------|-------------|-------------|-------------------------------|--------------------------------|-----------|-----------|-----------------|---------|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | 1.2E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 8.6E-09 | 3.3E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 1.6E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.2E-07 | 4.6E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 3.0E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 2.2E-08 | 8.4E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 2.5E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 1.8E-09 | 6.9E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 1.9E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 1.4E-10 | 5.3E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 3.5E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 2.6E-08 | 9.8E-09 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 8.7E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 6.3E-09 | 2.4E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 9.7E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.9E-08 | 2.7E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 1.4E-03 | | |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 9.8E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 2.0E-08 | 2.7E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 1.0E-09 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 1.7E-08 | 2.9E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 5.8E-05 | | |
| | | | | Aluminum | 1.3E+04 | mg/kg | 9.7E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.7E-03 | mg/kg/day | 1.0E+00 | mg/kg/day | 2.7E-03 | | |
| | | | | Antimony | 2.4E+00 | mg/kg | 1.8E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.9E-07 | mg/kg/day | 4.0E-04 | mg/kg/day | 1.2E-03 | | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 1.6E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 2.4E-06 | 4.5E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.5E-02 | | |
| | | | | Barium | 1.2E+02 | mg/kg | 8.8E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.5E-05 | mg/kg/day | 2.0E-01 | mg/kg/day | 1.2E-04 | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 5.2E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.4E-06 | mg/kg/day | 1.0E-03 | mg/kg/day | 1.4E-03 | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 1.7E-06 | mg/kg/day | 5.0E-01 | 1/mg/kg-day | 8.7E-07 | 4.9E-06 | mg/kg/day | 3.0E-03 | mg/kg/day | 1.6E-03 | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 1.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.4E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.5E-03 | | |
| | | | | Copper | 3.5E+01 | mg/kg | 2.5E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.0E-06 | mg/kg/day | 4.0E-02 | mg/kg/day | 1.8E-04 | | |
| | | | | Iron | 1.1E+04 | mg/kg | 8.1E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.3E-03 | mg/kg/day | 7.0E-01 | mg/kg/day | 3.2E-03 | | |
| | | | | Lead | 1.5E+02 | mg/kg | 1.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.0E-05 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 7.5E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.1E-05 | mg/kg/day | 1.4E-01 | mg/kg/day | 1.5E-04 | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 2.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.5E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.5E-03 | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 8.7E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.4E-07 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 2.7E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.6E-06 | mg/kg/day | 5.0E-03 | mg/kg/day | 1.5E-03 | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 5.9E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.7E-04 | mg/kg/day | 3.0E-01 | mg/kg/day | 5.5E-04 | | |
| | | | Exp. Route Total | | | | | | | | 3.5E-06 | | | | | 3.3E-02 | | |
| | | | Dermal | Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | 1.0E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 7.4E-09 | 2.8E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 1.4E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.0E-07 | 3.9E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 2.6E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.9E-08 | 7.2E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 2.1E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 1.5E-09 | 5.9E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Chrysene | 2.6E-01 | mg/kg | 1.7E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 1.3E-10 | 4.9E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 3.0E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 2.2E-08 | 8.4E-09 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 8.0E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 5.9E-09 | 2.2E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 8.9E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.8E-08 | 2.5E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 1.2E-03 | |
| | | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 6.5E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.3E-08 | 1.8E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | | Dieldrin | 1.4E-02 | mg/kg | 8.9E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 1.4E-08 | 2.5E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 5.0E-05 | |
| | | | | | Aluminum | 1.3E+04 | mg/kg | 6.4E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.8E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 1.8E-04 | |
| | | | | | Antimony | 2.4E+00 | mg/kg | 1.2E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.3E-08 | mg/kg/day | 6.0E-05 | mg/kg/day | 5.4E-04 | |
| | | | | | Arsenic | 2.2E+01 | mg/kg | 3.2E-07 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 4.7E-07 | 8.8E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.9E-03 | |
| | | | | | Barium | 1.2E+02 | mg/kg | 5.8E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.6E-06 | mg/kg/day | 1.4E-02 | mg/kg/day | 1.2E-04 | |
| | | | | | Cadmium | 7.1E+00 | mg/kg | 3.4E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 9.6E-09 | mg/kg/day | 2.5E-05 | mg/kg/day | 3.8E-04 | |

TABLE 7.2.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Maintenance Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | | | | | | | |
|--|-----------------|-----------------------|------------------|-------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|-------------|--------------------------------|--|---------|-----------|-----------------|---------|---------|---------|--|--|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient | | | | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | | | | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 1.1E-07 | mg/kg/day | 1.3E-02 | 1/mg/kg-day | 1.4E-09 | 3.2E-07 | mg/kg/day | 7.5E-05 | mg/kg/day | 4.3E-03 | | | | | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 1.0E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.9E-08 | mg/kg/day | 3.0E-04 | mg/kg/day | 9.7E-05 | | | | | | |
| | | | | Copper | 3.5E+01 | mg/kg | 1.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.6E-07 | mg/kg/day | 4.0E-02 | mg/kg/day | 1.2E-05 | | | | | | |
| | | | | Iron | 1.1E+04 | mg/kg | 5.4E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.5E-04 | mg/kg/day | 7.0E-01 | mg/kg/day | 2.1E-04 | | | | | | |
| | | | | Lead | 1.5E+02 | mg/kg | 7.2E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.0E-06 | mg/kg/day | NA | mg/kg/day | NA | | | | | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 5.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.4E-06 | mg/kg/day | 5.6E-03 | mg/kg/day | 2.5E-04 | | | | | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 1.8E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.0E-08 | mg/kg/day | 2.1E-05 | mg/kg/day | 2.4E-03 | | | | | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 5.8E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.6E-08 | mg/kg/day | NA | mg/kg/day | NA | | | | | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 1.8E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.0E-07 | mg/kg/day | 1.3E-04 | mg/kg/day | 3.9E-03 | | | | | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 3.9E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.1E-05 | mg/kg/day | 3.0E-01 | mg/kg/day | 3.6E-05 | | | | | | |
| | | | | Exp. Route Total | | | | | | | | 6.8E-07 | | | | 1.7E-02 | | | | | | |
| | | | | Exposure Point Total | | | | | | | | 4.2E-06 | | | | 5.0E-02 | | | | | | |
| Exposure Medium Total | | | | | | | | | | | | | | | | 5.0E-02 | | | | | | |
| | Air | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | 3.1E-10 | mg/kg/day | 8.4E+01 | mg/m³ | 2.6E-08 | 8.6E-10 | mg/kg/day | 1.0E-04 | mg/m³ | 8.6E-06 | | | | | | |
| | | | Exp. Route Total | | | | | | | | 2.6E-08 | | | | | | 8.6E-06 | | | | | |
| | | Exposure Point Total | | | | | | | | | | 2.6E-08 | | | | | | 8.6E-06 | | | | |
| | | Exposure Medium Total | | | | | | | | | | 2.6E-08 | | | | | | 8.6E-06 | | | | |
| Soil Total | | | | | | | | | | | | | 4.2E-06 | | | | | | 5.0E-02 | | | |
| Total of Receptor Risks Across All Media | | | | | | | | | | | | 4.2E-06 | Total of Receptor Hazards Across All Media | | | 5.0E-02 | | | | | | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | Non-Cancer Hazard Calculations | | | | | |
|------------|-----------------|----------------|--------------------------------|-------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|-------------|-------------------------------|--------------------------------|---------|-----------|-----------------|--|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RC | | Hazard Quotient | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | 1.1E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 8.2E-09 | 3.3E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 1.6E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.1E-07 | 4.6E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 2.9E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 2.1E-08 | 8.4E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 2.4E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 1.7E-09 | 6.9E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 1.8E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 1.3E-10 | 5.3E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 3.4E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 2.5E-08 | 9.8E-09 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 8.3E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 6.1E-09 | 2.4E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 9.3E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.9E-08 | 2.7E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 1.4E-03 | | |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 9.4E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.9E-08 | 2.7E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 1.0E-09 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 1.6E-08 | 2.9E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 5.8E-05 | | |
| | | | | Aluminum | 1.3E+04 | mg/kg | 9.3E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.7E-03 | mg/kg/day | 1.0E+00 | mg/kg/day | 2.7E-03 | | |
| | | | | Antimony | 2.4E+00 | mg/kg | 1.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.9E-07 | mg/kg/day | 4.0E-04 | mg/kg/day | 1.2E-03 | | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 1.5E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 2.3E-06 | 4.5E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.5E-02 | | |
| | | | | Barium | 1.2E+02 | mg/kg | 8.5E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.5E-05 | mg/kg/day | 2.0E-01 | mg/kg/day | 1.2E-04 | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 5.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.4E-06 | mg/kg/day | 1.0E-03 | mg/kg/day | 1.4E-03 | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 1.7E-06 | mg/kg/day | 5.0E-01 | 1/mg/kg-day | 8.3E-07 | 4.9E-06 | mg/kg/day | 3.0E-03 | mg/kg/day | 1.6E-03 | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 1.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.4E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.5E-03 | | |
| | | | | Copper | 3.5E+01 | mg/kg | 2.4E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.0E-06 | mg/kg/day | 4.0E-02 | mg/kg/day | 1.8E-04 | | |
| | | | | Iron | 1.1E+04 | mg/kg | 7.8E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.3E-03 | mg/kg/day | 7.0E-01 | mg/kg/day | 3.2E-03 | | |
| | | | | Lead | 1.5E+02 | mg/kg | 1.0E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.0E-05 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 7.2E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.1E-05 | mg/kg/day | 1.4E-01 | mg/kg/day | 1.5E-04 | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 2.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.5E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.5E-03 | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 8.4E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.4E-07 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 2.6E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.6E-06 | mg/kg/day | 5.0E-03 | mg/kg/day | 1.5E-03 | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 5.7E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.7E-04 | mg/kg/day | 3.0E-01 | mg/kg/day | 5.5E-04 | | |
| | | | Exp. Route Total | | | | | | | | 3.4E-06 | | | | | 3.3E-02 | | |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | 5.8E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 4.3E-09 | 1.7E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 8.1E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 5.9E-08 | 2.4E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 1.5E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.1E-08 | 4.3E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 1.2E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 8.9E-10 | 3.6E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 9.4E-09 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 6.9E-11 | 2.7E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 1.7E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.3E-08 | 5.1E-09 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 4.3E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 3.2E-09 | 1.3E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 5.2E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.0E-08 | 1.5E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 7.6E-04 | | |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 5.3E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.1E-08 | 1.5E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 4.0E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 6.4E-09 | 1.2E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 2.3E-05 | | |
| | | | | Aluminum | 1.3E+04 | mg/kg | 3.7E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.1E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 1.1E-04 | | |
| | | | | Antimony | 2.4E+00 | mg/kg | 6.8E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.0E-08 | mg/kg/day | 6.0E-05 | mg/kg/day | 3.3E-04 | | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 1.8E-07 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 2.7E-07 | 5.3E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.8E-03 | | |
| | | | | Barium | 1.2E+02 | mg/kg | 3.4E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 9.9E-07 | mg/kg/day | 1.4E-02 | mg/kg/day | 7.0E-05 | | |

TABLE 7.3.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | Non-Cancer Hazard Calculations | | | | | | | | |
|--|---------------------|----------------|----------------|-------------------------------|---------|---------|-------------------------------|-----------|---------------|-------------|-------------|-------------------------------|--------------------------------|--|-----------|-----------------|--|---------|---------|---------|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RIC | | Hazard Quotient | | | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | | | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 2.0E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.8E-09 | mg/kg/day | 2.5E-05 | mg/kg/day | 2.3E-04 | | | | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 6.7E-08 | mg/kg/day | 1.3E-02 | 1/mg/kg-day | 8.3E-10 | 1.9E-07 | mg/kg/day | 7.5E-05 | mg/kg/day | 2.6E-03 | | | | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 6.0E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.8E-08 | mg/kg/day | 3.0E-04 | mg/kg/day | 5.9E-05 | | | | | |
| | | | | Copper | 3.5E+01 | mg/kg | 9.6E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.8E-07 | mg/kg/day | 4.0E-02 | mg/kg/day | 7.0E-06 | | | | | |
| | | | | Iron | 1.1E+04 | mg/kg | 3.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 9.1E-05 | mg/kg/day | 7.0E-01 | mg/kg/day | 1.3E-04 | | | | | |
| | | | | Lead | 1.5E+02 | mg/kg | 4.2E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.2E-06 | mg/kg/day | NA | mg/kg/day | NA | | | | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 2.9E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 8.4E-07 | mg/kg/day | 5.6E-03 | mg/kg/day | 1.5E-04 | | | | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 1.0E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.0E-08 | mg/kg/day | 2.1E-05 | mg/kg/day | 1.4E-03 | | | | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 3.3E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 9.7E-09 | mg/kg/day | NA | mg/kg/day | NA | | | | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 1.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.0E-07 | mg/kg/day | 1.3E-04 | mg/kg/day | 2.3E-03 | | | | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 2.3E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.6E-06 | mg/kg/day | 3.0E-01 | mg/kg/day | 2.2E-05 | | | | | |
| | | | | Exp. Route Total | | | | | | | 3.9E-07 | | | | | | | 1.0E-02 | | | |
| | | | | Exposure Point Total | | | | | | | 3.8E-06 | | | | | | | 4.3E-02 | | | |
| Exposure Medium Total | | | | | | | | | | | | 3.8E-06 | | | | | | | 4.3E-02 | | |
| Air | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | 7.4E-11 | mg/kg/day | 8.4E+01 | mg/m³ | 6.2E-09 | 8.6E-10 | mg/kg/day | 1.0E-04 | mg/m³ | 8.6E-06 | | | | | | |
| Exp. Route Total | | | | | | | | | | | | 6.2E-09 | | | | | | | 8.6E-06 | | |
| Soil Total | | | | | | | | | | | | 3.8E-06 | | | | | | | 4.3E-02 | | |
| Total of Receptor Risks Across All Media | | | | | | | | | | | | | 3.8E-06 | Total of Receptor Hazards Across All Media | | | | | | 4.3E-02 | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Youth |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | | Hazard Quotient | |
|------------|-----------------|----------------|--------------------------------|-------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|-------------|--------------------------------|-----------|---------|-----------|---------|-----------------|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | 7.3E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 5.3E-09 | 5.1E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 1.0E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 7.4E-08 | 7.1E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 1.9E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.4E-08 | 1.3E-07 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 1.5E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 1.1E-09 | 1.1E-07 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 1.2E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 8.6E-11 | 8.2E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 2.2E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.6E-08 | 1.5E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 5.4E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 3.9E-09 | 3.8E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 6.0E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.2E-08 | 4.2E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 2.1E-03 | | |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 6.1E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.2E-08 | 4.3E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 6.5E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 1.0E-08 | 4.5E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 9.1E-05 | | |
| | | | | Aluminum | 1.3E+04 | mg/kg | 6.0E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.2E-03 | mg/kg/day | 1.0E+00 | mg/kg/day | 4.2E-03 | | |
| | | | | Antimony | 2.4E+00 | mg/kg | 1.1E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.7E-07 | mg/kg/day | 4.0E-04 | mg/kg/day | 1.9E-03 | | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 9.9E-07 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 1.5E-06 | 6.9E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.3E-02 | | |
| | | | | Barium | 1.2E+02 | mg/kg | 5.5E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.8E-05 | mg/kg/day | 2.0E-01 | mg/kg/day | 1.9E-04 | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 3.2E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.3E-06 | mg/kg/day | 1.0E-03 | mg/kg/day | 2.3E-03 | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 1.1E-06 | mg/kg/day | 5.0E-01 | 1/mg/kg-day | 5.4E-07 | 7.6E-06 | mg/kg/day | 3.0E-03 | mg/kg/day | 2.5E-03 | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 9.8E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.9E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.3E-03 | | |
| | | | | Copper | 3.5E+01 | mg/kg | 1.6E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.1E-05 | mg/kg/day | 4.0E-02 | mg/kg/day | 2.7E-04 | | |
| | | | | Iron | 1.1E+04 | mg/kg | 5.0E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.5E-03 | mg/kg/day | 7.0E-01 | mg/kg/day | 5.0E-03 | | |
| | | | | Lead | 1.5E+02 | mg/kg | 6.8E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.7E-05 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 4.7E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.3E-05 | mg/kg/day | 1.4E-01 | mg/kg/day | 2.3E-04 | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 1.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.2E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 3.9E-03 | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 5.4E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.8E-07 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 1.7E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.2E-05 | mg/kg/day | 5.0E-03 | mg/kg/day | 2.4E-03 | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 3.7E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.6E-04 | mg/kg/day | 3.0E-01 | mg/kg/day | 8.6E-04 | | |
| | | | Exp. Route Total | | | | | | | | 2.2E-06 | | | | | 5.1E-02 | | |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | 4.0E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 2.9E-09 | 2.8E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 5.5E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 4.0E-08 | 3.9E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 1.0E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 7.4E-09 | 7.1E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 8.3E-09 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 6.1E-10 | 5.8E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 6.4E-09 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 4.7E-11 | 4.5E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 1.2E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 8.7E-09 | 8.3E-09 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 3.0E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 2.2E-09 | 2.1E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 3.5E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 7.1E-09 | 2.5E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 1.2E-03 | | |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 3.6E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 7.2E-09 | 2.5E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 2.7E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 4.3E-09 | 1.9E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 3.8E-05 | | |
| | | | | Aluminum | 1.3E+04 | mg/kg | 2.5E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.8E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 1.8E-04 | | |

TABLE 7.4.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Youth |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | Non-Cancer Hazard Calculations | | | | | |
|--------|--|---------------------|----------------|-------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|-------------|-------------------------------|--|---------|-----------|-----------------|---------|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RFC | | Hazard Quotient | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | |
| | | | | Antimony | 2.4E+00 | mg/kg | 4.6E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.2E-08 | mg/kg/day | 6.0E-05 | mg/kg/day | 5.4E-04 | | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 1.2E-07 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 1.9E-07 | 8.7E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.9E-03 | | |
| | | | | Barium | 1.2E+02 | mg/kg | 2.3E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.6E-06 | mg/kg/day | 1.4E-02 | mg/kg/day | 1.2E-04 | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 1.4E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 9.5E-09 | mg/kg/day | 2.5E-05 | mg/kg/day | 3.8E-04 | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 4.5E-08 | mg/kg/day | 1.3E-02 | 1/mg/kg-day | 5.7E-10 | 3.2E-07 | mg/kg/day | 7.5E-05 | mg/kg/day | 4.2E-03 | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 4.1E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.9E-08 | mg/kg/day | 3.0E-04 | mg/kg/day | 9.6E-05 | | |
| | | | | Copper | 3.5E+01 | mg/kg | 6.6E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.6E-07 | mg/kg/day | 4.0E-02 | mg/kg/day | 1.2E-05 | | |
| | | | | Iron | 1.1E+04 | mg/kg | 2.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.5E-04 | mg/kg/day | 7.0E-01 | mg/kg/day | 2.1E-04 | | |
| | | | | Lead | 1.5E+02 | mg/kg | 2.8E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.0E-06 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 2.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.4E-06 | mg/kg/day | 5.6E-03 | mg/kg/day | 2.5E-04 | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 7.0E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.9E-08 | mg/kg/day | 2.1E-05 | mg/kg/day | 2.3E-03 | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 2.3E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.6E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 7.1E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.0E-07 | mg/kg/day | 1.3E-04 | mg/kg/day | 3.8E-03 | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 1.5E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.1E-05 | mg/kg/day | 3.0E-01 | mg/kg/day | 3.6E-05 | | |
| | | | | Exp. Route Total | | | | | | | | 2.7E-07 | | | | | 1.6E-02 | |
| | | | | Exposure Point Total | | | | | | | | 2.4E-06 | | | | | 6.8E-02 | |
| | Exposure Medium Total | | | | | | | | | | | 2.4E-06 | | | | | 6.8E-02 | |
| | Air | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | 3.1E-11 | mg/kg/day | 8.4E+01 | mg/m³ | 2.6E-09 | 8.6E-10 | mg/kg/day | 1.0E-04 | mg/m³ | 8.6E-06 | | |
| | | | | Exp. Route Total | | | | | | | | 2.6E-09 | | | | | 8.6E-06 | |
| | Soil Total | | | | | | | | | | | 2.4E-06 | | | | | 6.8E-02 | |
| | Total of Receptor Risks Across All Media | | | | | | | | | | | 2.5E-06 | Total of Receptor Hazards Across All Media | | | | | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | | |
|------------|-----------------|----------------|----------------|--------------------------------|--------------------|---------|-------------------------------|-----------|---------------|-------------|-------------|--------------------------------|-----------|-----------|-----------|-----------------|---------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | |
| Total Soil | Total Soil | Ingestion | | Benzo(a)anthracene | 1.6E-01 | mg/kg | 2.6E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.9E-08 | 3.1E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 3.6E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 2.7E-07 | 4.3E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 6.7E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 4.9E-08 | 7.8E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 5.5E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 4.0E-09 | 6.4E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 4.2E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 3.1E-10 | 4.9E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 7.9E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 5.7E-08 | 9.2E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 1.9E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.4E-08 | 2.3E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 2.2E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 4.3E-08 | 2.5E-07 | mg/kg/day | 2.0E-05 | mg/kg/day | 1.3E-02 | |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 2.2E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 4.4E-08 | 2.6E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 2.3E-09 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 3.7E-08 | 2.7E-08 | mg/kg/day | 5.0E-05 | mg/kg/day | 5.4E-04 | |
| | | | | Aluminum | 1.3E+04 | mg/kg | 2.2E-03 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.5E-02 | mg/kg/day | 1.0E+00 | mg/kg/day | 2.5E-02 | |
| | | | | Antimony | 2.4E+00 | mg/kg | 4.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.6E-06 | mg/kg/day | 4.0E-04 | mg/kg/day | 1.2E-02 | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 3.6E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 5.4E-06 | 4.2E-05 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.4E-01 | |
| | | | | Barium | 1.2E+02 | mg/kg | 2.0E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.3E-04 | mg/kg/day | 2.0E-01 | mg/kg/day | 1.2E-03 | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 1.2E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.4E-05 | mg/kg/day | 1.0E-03 | mg/kg/day | 1.4E-02 | |
| | | | | Chromium | 2.4E+01 | mg/kg | 3.9E-06 | mg/kg/day | 5.0E-01 | 1/mg/kg-day | 1.9E-06 | 4.5E-05 | mg/kg/day | 3.0E-03 | mg/kg/day | 1.5E-02 | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 3.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.1E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.4E-02 | |
| | | | | Copper | 3.5E+01 | mg/kg | 5.6E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.6E-05 | mg/kg/day | 4.0E-02 | mg/kg/day | 1.6E-03 | |
| | | | | Iron | 1.1E+04 | mg/kg | 1.8E-03 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.1E-02 | mg/kg/day | 7.0E-01 | mg/kg/day | 3.0E-02 | |
| | | | | Lead | 1.5E+02 | mg/kg | 2.4E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.8E-04 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Manganese | 1.0E+02 | mg/kg | 1.7E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.0E-04 | mg/kg/day | 1.4E-01 | mg/kg/day | 1.4E-03 | |
| | | | | Mercury | 3.7E+00 | mg/kg | 6.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.0E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.3E-02 | |
| | | | | Thallium | 1.2E+00 | mg/kg | 2.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.3E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 6.1E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.1E-05 | mg/kg/day | 5.0E-03 | mg/kg/day | 1.4E-02 | |
| | | | | Zinc | 8.1E+02 | mg/kg | 1.3E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.5E-03 | mg/kg/day | 3.0E-01 | mg/kg/day | 5.1E-03 | |
| | | | | Exp. Route Total | | | | | | | | | 7.8E-06 | | | | 3.1E-01 |
| | | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | 9.6E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 7.0E-09 | 1.1E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 1.3E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 9.7E-08 | 1.5E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 2.4E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.8E-08 | 2.8E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 2.0E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 1.5E-09 | 2.3E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 1.5E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 1.1E-10 | 1.8E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 2.9E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 2.1E-08 | 3.3E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 7.1E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 5.2E-09 | 8.3E-08 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 8.5E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.7E-08 | 9.9E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 4.9E-03 | |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 8.6E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.7E-08 | 1.0E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 6.5E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 1.0E-08 | 7.6E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 1.5E-04 | |
| | | | | Aluminum | 1.3E+04 | mg/kg | 6.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.1E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 7.1E-04 | |

TABLE 7.5.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | Non-Cancer Hazard Calculations | | | | | |
|--------|-----------------|---------------------|----------------|-------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|-------------|--|--------------------------------|---------|-----------|-----------------|--|---------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | |
| | | | | Antimony | 2.4E+00 | mg/kg | 1.1E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.3E-07 | mg/kg/day | 6.0E-05 | mg/kg/day | 2.2E-03 | | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 3.0E-07 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 4.5E-07 | 3.5E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.2E-02 | | |
| | | | | Barium | 1.2E+02 | mg/kg | 5.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.5E-06 | mg/kg/day | 1.4E-02 | mg/kg/day | 4.6E-04 | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 3.2E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.8E-08 | mg/kg/day | 2.5E-05 | mg/kg/day | 1.5E-03 | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 1.1E-07 | mg/kg/day | 1.3E-02 | 1/mg/kg-day | 1.4E-09 | 1.3E-06 | mg/kg/day | 7.5E-05 | mg/kg/day | 1.7E-02 | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 9.9E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.2E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 3.8E-04 | | |
| | | | | Copper | 3.5E+01 | mg/kg | 1.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.8E-06 | mg/kg/day | 4.0E-02 | mg/kg/day | 4.6E-05 | | |
| | | | | Iron | 1.1E+04 | mg/kg | 5.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.9E-04 | mg/kg/day | 7.0E-01 | mg/kg/day | 8.5E-04 | | |
| | | | | Lead | 1.5E+02 | mg/kg | 6.8E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.9E-06 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 4.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.5E-06 | mg/kg/day | 5.6E-03 | mg/kg/day | 9.8E-04 | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 1.7E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.0E-07 | mg/kg/day | 2.1E-05 | mg/kg/day | 9.4E-03 | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 5.5E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.4E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 1.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.0E-06 | mg/kg/day | 1.3E-04 | mg/kg/day | 1.5E-02 | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 3.7E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.3E-05 | mg/kg/day | 3.0E-01 | mg/kg/day | 1.4E-04 | | |
| | | | | Exp. Route Total | | | | | | | | 6.4E-07 | | | | | 6.6E-02 | |
| | | | | Exposure Point Total | | | | | | | | 8.5E-06 | | | | | 3.7E-01 | |
| | | | | Exposure Medium Total | | | | | | | | 8.5E-06 | | | | | 3.7E-01 | |
| | Air | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | 1.8E-11 | mg/kg/day | 8.4E+01 | mg/m³ | 1.5E-09 | 8.6E-10 | mg/kg/day | 1.0E-04 | mg/m³ | 8.6E-06 | | |
| | | | | Exp. Route Total | | | | | | | | 1.5E-09 | | | | | 8.6E-06 | |
| | | | | Soil Total | | | | | | | | 8.5E-06 | | | | | 3.7E-01 | |
| | | | | | | | | | | | | Total of Receptor Risks Across All Media | 8.5E-06 | | | | Total of Receptor Hazards Across All Media | 3.7E-01 |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Future |
| Receptor Population: Construction Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | |
|------------|-----------------|----------------|--------------------------------|-------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|--------------------------------|-------------------------------|-----------|---------|-----------------|---------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RIC | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | 1.1E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 7.9E-09 | 7.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 1.5E-08 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 1.1E-07 | 1.1E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 2.8E-08 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 2.0E-08 | 1.9E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 2.3E-08 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 1.7E-09 | 1.6E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.6E-01 | mg/kg | 1.7E-08 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 1.3E-10 | 1.2E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 3.2E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 2.4E-08 | 2.3E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 8.0E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 5.9E-09 | 5.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 8.9E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.8E-08 | 6.2E-07 | mg/kg/day | 5.0E-05 | mg/kg/day | 1.2E-02 |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 9.1E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.8E-08 | 6.3E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 9.6E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 1.5E-08 | 6.7E-08 | mg/kg/day | 5.0E-05 | mg/kg/day | 1.3E-03 |
| | | | | Aluminum | 1.3E+04 | mg/kg | 8.9E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.3E-02 | mg/kg/day | 1.0E+00 | mg/kg/day | 6.3E-02 |
| | | | | Antimony | 2.4E+00 | mg/kg | 1.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.1E-05 | mg/kg/day | 4.0E-04 | mg/kg/day | 2.9E-02 |
| | | | | Arsenic | 2.2E+01 | mg/kg | 1.5E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 2.2E-06 | 1.0E-04 | mg/kg/day | 3.0E-04 | mg/kg/day | 3.4E-01 |
| | | | | Barium | 1.2E+02 | mg/kg | 8.1E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.7E-04 | mg/kg/day | 7.0E-02 | mg/kg/day | 8.1E-03 |
| | | | | Cadmium | 7.1E+00 | mg/kg | 4.8E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.3E-05 | mg/kg/day | 1.0E-03 | mg/kg/day | 3.3E-02 |
| | | | | Chromium | 2.4E+01 | mg/kg | 1.6E-06 | mg/kg/day | 5.0E-01 | 1/mg/kg-day | 8.0E-07 | 1.1E-04 | mg/kg/day | 2.0E-02 | mg/kg/day | 5.6E-03 |
| | | | | Cobalt | 2.2E+00 | mg/kg | 1.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.0E-05 | mg/kg/day | 3.0E-03 | mg/kg/day | 3.4E-03 |
| | | | | Copper | 3.5E+01 | mg/kg | 2.3E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.6E-04 | mg/kg/day | 4.0E-02 | mg/kg/day | 4.1E-03 |
| | | | | Iron | 1.1E+04 | mg/kg | 7.5E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.2E-02 | mg/kg/day | 7.0E-01 | mg/kg/day | 7.5E-02 |
| | | | | Lead | 1.5E+02 | mg/kg | 1.0E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.0E-04 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Manganese | 1.0E+02 | mg/kg | 6.9E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.9E-04 | mg/kg/day | 1.4E-01 | mg/kg/day | 3.5E-03 |
| | | | | Mercury | 3.7E+00 | mg/kg | 2.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.7E-05 | mg/kg/day | 3.0E-03 | mg/kg/day | 5.8E-03 |
| | | | | Thallium | 1.2E+00 | mg/kg | 8.1E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.6E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Vanadium | 3.7E+01 | mg/kg | 2.5E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.8E-04 | mg/kg/day | 7.0E-03 | mg/kg/day | 2.5E-02 |
| | | | | Zinc | 8.1E+01 | mg/kg | 5.4E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 3.8E-03 | mg/kg/day | 3.0E-01 | mg/kg/day | 1.3E-02 |
| | | | Exp. Route Total | | | | | | | | 3.2E-06 | | | | 6.2E-01 | |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | 1.9E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.4E-09 | 1.4E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 2.7E-09 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 2.0E-08 | 1.9E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 4.9E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 3.6E-09 | 3.5E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 4.0E-09 | mg/kg/day | 7.3E-02 | 1/mg/kg-day | 3.0E-10 | 2.8E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.6E-01 | mg/kg | 3.1E-09 | mg/kg/day | 7.3E-03 | 1/mg/kg-day | 2.3E-11 | 2.2E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 5.8E-10 | mg/kg/day | 7.3E+00 | 1/mg/kg-day | 4.2E-09 | 4.1E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 1.4E-09 | mg/kg/day | 7.3E-01 | 1/mg/kg-day | 1.0E-09 | 1.0E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 1.7E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 3.4E-09 | 1.2E-07 | mg/kg/day | 5.0E-05 | mg/kg/day | 2.4E-03 |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 1.7E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 3.5E-09 | 1.2E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 1.3E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 2.1E-09 | 9.2E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 1.8E-04 |
| | | | | Aluminum | 1.3E+04 | mg/kg | 1.2E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 8.6E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 8.6E-04 |
| | | | | Antimony | 2.4E+00 | mg/kg | 2.2E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.6E-07 | mg/kg/day | 6.0E-05 | mg/kg/day | 2.6E-03 |
| | | | | Arsenic | 2.2E+01 | mg/kg | 6.1E-08 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 9.1E-08 | 4.2E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.4E-02 |
| | | | | Barium | 1.2E+02 | mg/kg | 1.1E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.8E-06 | mg/kg/day | 4.9E-03 | mg/kg/day | 1.6E-03 |

TABLE 7.6.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Future |
| Receptor Population: Construction Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | | | | | | | | | | | | | |
|-----------------------|-----------------|----------------|----------------|-------------------------------|------------------|----------|-------------------------------|-----------|---------------|-------------|-------------|--|-----------|---------|--|-----------------|---------|---------|---------|--|--|--|--|--|--|--|--|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RIC | | Hazard Quotient | | | | | | | | | | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | | | | | | | | | | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 6.6E-10 | mg/kg/day | NA | 1/mg/kg-day | NA | 4.6E-08 | mg/kg/day | 2.5E-05 | mg/kg/day | 1.8E-03 | | | | | | | | | | | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 2.2E-08 | mg/kg/day | 1.3E-02 | 1/mg/kg-day | 2.8E-10 | 1.5E-06 | mg/kg/day | 5.0E-04 | mg/kg/day | 3.1E-03 | | | | | | | | | | | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 2.0E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 1.4E-07 | mg/kg/day | 3.0E-03 | mg/kg/day | 4.7E-05 | | | | | | | | | | | | |
| | | | | Copper | 3.5E+01 | mg/kg | 3.2E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.2E-06 | mg/kg/day | 4.0E-02 | mg/kg/day | 5.6E-05 | | | | | | | | | | | | |
| | | | | Iron | 1.1E+04 | mg/kg | 1.0E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.2E-04 | mg/kg/day | 7.0E-01 | mg/kg/day | 1.0E-03 | | | | | | | | | | | | |
| | | | | Lead | 1.5E+02 | mg/kg | 1.4E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 9.6E-06 | mg/kg/day | NA | mg/kg/day | NA | | | | | | | | | | | | |
| | | | | Manganese | 1.0E+02 | mg/kg | 9.5E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 6.7E-06 | mg/kg/day | 5.6E-03 | mg/kg/day | 1.2E-03 | | | | | | | | | | | | |
| | | | | Mercury | 3.7E+00 | mg/kg | 3.4E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.4E-07 | mg/kg/day | 2.1E-04 | mg/kg/day | 1.1E-03 | | | | | | | | | | | | |
| | | | | Thallium | 1.2E+00 | mg/kg | 1.1E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | 7.7E-08 | mg/kg/day | NA | mg/kg/day | NA | | | | | | | | | | | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 3.5E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | 2.4E-06 | mg/kg/day | 1.8E-04 | mg/kg/day | 1.3E-02 | | | | | | | | | | | | |
| | | | | Zinc | 8.1E+02 | mg/kg | 7.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | 5.2E-05 | mg/kg/day | 3.0E-01 | mg/kg/day | 1.7E-04 | | | | | | | | | | | | |
| | | | | Exp. Route Total | | | | | | | | 1.3E-07 | | | | | 4.4E-02 | | | | | | | | | | | |
| | | | | Exposure Point Total | | | | | | | | 3.4E-06 | | | | | 6.7E-01 | | | | | | | | | | | |
| Exposure Medium Total | | | | | | | | | | | | 3.4E-06 | | | | | 6.7E-01 | | | | | | | | | | | |
| Air | | | | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | 5.9E-11 | mg/kg/day | 8.4E+01 | mg/m³ | 5.0E-09 | 4.1E-09 | mg/kg/day | 1.0E-04 | mg/m³ | 4.1E-05 | | | | | | | | | | |
| | | | | | Exp. Route Total | | | | | | | | 5.0E-09 | | | | | 4.1E-05 | | | | | | | | | | |
| | | | | Exposure Point Total | | | | | | | | | | 5.0E-09 | | | | | 4.1E-05 | | | | | | | | | |
| | | | | Exposure Medium Total | | | | | | | | | | 5.0E-09 | | | | | 4.1E-05 | | | | | | | | | |
| Soil Total | | | | | | | | | | | | 3.4E-06 | | | | | 6.7E-01 | | | | | | | | | | | |
| | | | | | | | | | | | | Total of Receptor Risks Across All Media | 3.4E-06 | | | | | 6.7E-01 | | | | | | | | | | |
| | | | | | | | | | | | | | | | Total of Receptor Hazards Across All Media | 6.7E-01 | | | | | | | | | | | | |

Soil* = Surface soil and subsurface soil combined.

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001; other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | | |
|------------|-----------------|----------------|--------------------------------|-------------------------------|---------|-------|-------------------------------|-------|---------------|-------|--------------------------------|-------------------------------|-----------|---------|-----------|-----------------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RC | | Hazard Quotient |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | NA | | NA | | NA | 2.2E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | NA | | NA | | NA | 3.1E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | NA | | NA | | NA | 5.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | NA | | NA | | NA | 4.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.6E-01 | mg/kg | NA | | NA | | NA | 3.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | NA | | NA | | NA | 6.6E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | NA | | NA | | NA | 1.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | NA | | NA | | NA | 1.8E-07 | mg/kg/day | 2.0E-05 | mg/kg/day | 9.1E-03 |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | NA | | NA | | NA | 1.8E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | NA | | NA | | NA | 2.0E-08 | mg/kg/day | 5.0E-05 | mg/kg/day | 3.9E-04 |
| | | | | Aluminum | 1.3E+04 | mg/kg | NA | | NA | | NA | 1.8E-02 | mg/kg/day | 1.0E+00 | mg/kg/day | 1.8E-02 |
| | | | | Antimony | 2.4E+00 | mg/kg | NA | | NA | | NA | 3.3E-06 | mg/kg/day | 4.0E-04 | mg/kg/day | 8.3E-03 |
| | | | | Arsenic | 2.2E+01 | mg/kg | NA | | NA | | NA | 3.0E-05 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.0E-01 |
| | | | | Barium | 1.2E+02 | mg/kg | NA | | NA | | NA | 1.7E-04 | mg/kg/day | 2.0E-01 | mg/kg/day | 8.3E-04 |
| | | | | Cadmium | 7.1E+00 | mg/kg | NA | | NA | | NA | 9.7E-06 | mg/kg/day | 1.0E-03 | mg/kg/day | 9.7E-03 |
| | | | | Chromium | 2.4E+01 | mg/kg | NA | | NA | | NA | 3.3E-05 | mg/kg/day | 3.0E-03 | mg/kg/day | 1.1E-02 |
| | | | | Cobalt | 2.2E+00 | mg/kg | NA | | NA | | NA | 3.0E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 9.9E-03 |
| | | | | Copper | 3.5E+01 | mg/kg | NA | | NA | | NA | 4.7E-05 | mg/kg/day | 4.0E-02 | mg/kg/day | 1.2E-03 |
| | | | | Iron | 1.1E+04 | mg/kg | NA | | NA | | NA | 1.5E-02 | mg/kg/day | 7.0E-01 | mg/kg/day | 2.2E-02 |
| | | | | Lead | 1.5E+02 | mg/kg | NA | | NA | | NA | 2.0E-04 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Manganese | 1.0E+02 | mg/kg | NA | | NA | | NA | 1.4E-04 | mg/kg/day | 1.4E-01 | mg/kg/day | 1.0E-03 |
| | | | | Mercury | 3.7E+00 | mg/kg | NA | | NA | | NA | 5.1E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.7E-02 |
| | | | | Thallium | 1.2E+00 | mg/kg | NA | | NA | | NA | 1.6E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Vanadium | 3.7E+01 | mg/kg | NA | | NA | | NA | 5.1E-05 | mg/kg/day | 5.0E-03 | mg/kg/day | 1.0E-02 |
| | | | | Zinc | 8.1E+02 | mg/kg | NA | | NA | | NA | 1.1E-03 | mg/kg/day | 3.0E-01 | mg/kg/day | 3.7E-03 |
| | | | Exp. Route Total | | | | | | | | 0.0E+00 | | | | 2.2E-01 | |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | NA | | NA | | NA | 1.1E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | NA | | NA | | NA | 1.6E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | NA | | NA | | NA | 2.9E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | NA | | NA | | NA | 2.4E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.6E-01 | mg/kg | NA | | NA | | NA | 1.8E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | NA | | NA | | NA | 3.4E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | NA | | NA | | NA | 8.5E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | NA | | NA | | NA | 1.0E-07 | mg/kg/day | 2.0E-05 | mg/kg/day | 5.1E-03 |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | NA | | NA | | NA | 1.0E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | NA | | NA | | NA | 7.8E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 1.6E-04 |
| | | | | Aluminum | 1.3E+04 | mg/kg | NA | | NA | | NA | 7.3E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 7.3E-04 |
| | | | | Antimony | 2.4E+00 | mg/kg | NA | | NA | | NA | 1.3E-07 | mg/kg/day | 6.0E-05 | mg/kg/day | 2.2E-03 |
| | | | | Arsenic | 2.2E+01 | mg/kg | NA | | NA | | NA | 3.6E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.2E-02 |
| | | | | Barium | 1.2E+02 | mg/kg | NA | | NA | | NA | 6.6E-06 | mg/kg/day | 1.4E-02 | mg/kg/day | 4.7E-04 |

TABLE 7.7.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | Non-Cancer Hazard Calculations | | | | | |
|------------------------------|-----------------|------------------------------|------------------|-------------------------------|---------|-------|-------------------------------|-------|---------------|-------|-------------|--|--------------------------------|--|-----------|-----------------|---------|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | Hazard Quotient | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | NA | | NA | | NA | 3.9E-08 | mg/kg/day | 2.5E-05 | mg/kg/day | 1.6E-03 | | |
| | | | | Chromium | 2.4E+01 | mg/kg | NA | | NA | | NA | 1.3E-06 | mg/kg/day | 7.5E-05 | mg/kg/day | 1.7E-02 | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | NA | | NA | | NA | 1.2E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 3.9E-04 | | |
| | | | | Copper | 3.5E+01 | mg/kg | NA | | NA | | NA | 1.9E-06 | mg/kg/day | 4.0E-02 | mg/kg/day | 4.7E-05 | | |
| | | | | Iron | 1.1E+04 | mg/kg | NA | | NA | | NA | 6.1E-04 | mg/kg/day | 7.0E-01 | mg/kg/day | 8.7E-04 | | |
| | | | | Lead | 1.5E+02 | mg/kg | NA | | NA | | NA | 8.2E-06 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Manganese | 1.0E+02 | mg/kg | NA | | NA | | NA | 5.6E-06 | mg/kg/day | 5.6E-03 | mg/kg/day | 1.0E-03 | | |
| | | | | Mercury | 3.7E+00 | mg/kg | NA | | NA | | NA | 2.0E-07 | mg/kg/day | 2.1E-05 | mg/kg/day | 9.6E-03 | | |
| | | | | Thallium | 1.2E+00 | mg/kg | NA | | NA | | NA | 6.6E-08 | mg/kg/day | NA | mg/kg/day | NA | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | NA | | NA | | NA | 2.0E-06 | mg/kg/day | 1.3E-04 | mg/kg/day | 1.6E-02 | | |
| | | | | Zinc | 8.1E+02 | mg/kg | NA | | NA | | NA | 4.4E-05 | mg/kg/day | 3.0E-01 | mg/kg/day | 1.5E-04 | | |
| | | | Exp. Route Total | | | | | | | | | 0.0E+00 | | | | 6.7E-02 | | |
| | | | | Exposure Point Total | | | | | | | | 0.0E+00 | | | | 2.9E-01 | | |
| Exposure Medium Total | | | | | | | | | | | | 0.0E+00 | | | | 2.9E-01 | | |
| | Air | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | NA | | NA | | NA | 1.7E-08 | mg/kg/day | 1.0E-04 | mg/m³ | 1.7E-04 | | |
| | | | Exp. Route Total | | | | | | | | | 0.0E+00 | | | | 1.7E-04 | | |
| | | Exposure Point Total | | | | | | | | | | 0.0E+00 | | | | 1.7E-04 | | |
| | | Exposure Medium Total | | | | | | | | | | 0.0E+00 | | | | 1.7E-04 | | |
| Soil Total | | | | | | | | | | | | 0.0E+00 | | | | 2.9E-01 | | |
| | | | | | | | | | | | | Total of Receptor Risks Across All Media | 0.0E+00 | Total of Receptor Hazards Across All Media | | | 2.9E-01 | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | |
|------------|-----------------|----------------|--------------------------------|-------------------------------|---------|-------|-------------------------------|-------|---------------|-------|--------------------------------|-------------------------------|-----------|-----------|-----------------|----|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | NA | | NA | | NA | 2.2E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 2.2E-01 | mg/kg | NA | | NA | | NA | 3.0E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 4.1E-01 | mg/kg | NA | | NA | | NA | 5.5E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 3.4E-01 | mg/kg | NA | | NA | | NA | 4.5E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 2.6E-01 | mg/kg | NA | | NA | | NA | 3.5E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 4.8E-02 | mg/kg | NA | | NA | | NA | 6.4E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 1.2E-01 | mg/kg | NA | | NA | | NA | 1.6E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 1.3E-01 | mg/kg | NA | | NA | | NA | 1.8E-06 | mg/kg/day | 2.0E-05 | mg/kg/day | 8.9E-02 | |
| | | | | 1.4E-01 | mg/kg | NA | | NA | | NA | 1.8E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 1.4E-02 | mg/kg | NA | | NA | | NA | 1.9E-07 | mg/kg/day | 5.0E-05 | mg/kg/day | 3.8E-03 | |
| | | | | 1.3E+04 | mg/kg | NA | | NA | | NA | 1.8E-01 | mg/kg/day | 1.0E+00 | mg/kg/day | 1.8E-01 | |
| | | | | 2.4E+00 | mg/kg | NA | | NA | | NA | 3.2E-05 | mg/kg/day | 4.0E-04 | mg/kg/day | 8.1E-02 | |
| | | | | 2.2E+01 | mg/kg | NA | | NA | | NA | 2.9E-04 | mg/kg/day | 3.0E-04 | mg/kg/day | 9.7E-01 | |
| | | | | 1.2E+02 | mg/kg | NA | | NA | | NA | 1.6E-03 | mg/kg/day | 2.0E-01 | mg/kg/day | 8.1E-03 | |
| | | | | 7.1E+00 | mg/kg | NA | | NA | | NA | 9.5E-05 | mg/kg/day | 1.0E-03 | mg/kg/day | 9.5E-02 | |
| | | | | 2.4E+01 | mg/kg | NA | | NA | | NA | 3.2E-04 | mg/kg/day | 3.0E-03 | mg/kg/day | 1.1E-01 | |
| | | | | 2.2E+00 | mg/kg | NA | | NA | | NA | 2.9E-05 | mg/kg/day | 3.0E-04 | mg/kg/day | 9.6E-02 | |
| | | | | 3.5E+01 | mg/kg | NA | | NA | | NA | 4.6E-04 | mg/kg/day | 4.0E-02 | mg/kg/day | 1.2E-02 | |
| | | | | 1.1E+04 | mg/kg | NA | | NA | | NA | 1.5E-01 | mg/kg/day | 7.0E-01 | mg/kg/day | 2.1E-01 | |
| | | | | 1.5E+02 | mg/kg | NA | | NA | | NA | 2.0E-03 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 1.0E+02 | mg/kg | NA | | NA | | NA | 1.4E-03 | mg/kg/day | 1.4E-01 | mg/kg/day | 9.8E-03 | |
| | | | | 3.7E+00 | mg/kg | NA | | NA | | NA | 4.9E-05 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.6E-01 | |
| | | | | 1.2E+00 | mg/kg | NA | | NA | | NA | 1.6E-05 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | | 3.7E+01 | mg/kg | NA | | NA | | NA | 5.0E-04 | mg/kg/day | 5.0E-03 | mg/kg/day | 1.0E-01 | |
| | | | | 8.1E+02 | mg/kg | NA | | NA | | NA | 1.1E-02 | mg/kg/day | 3.0E-01 | mg/kg/day | 3.6E-02 | |
| | | | Exp. Route Total | | | | | | | | 0.0E+00 | | | | 2.2E+00 | |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.6E-01 | mg/kg | NA | | NA | | NA | 7.8E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | NA | | NA | | NA | 1.1E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | NA | | NA | | NA | 2.0E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | NA | | NA | | NA | 1.6E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | Chrysene | 2.6E-01 | mg/kg | NA | | NA | | NA | 1.3E-06 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | Dibenzo(a,h)anthracene | 4.8E-02 | mg/kg | NA | | NA | | NA | 2.3E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | NA | | NA | | NA | 5.8E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | Aroclor-1254 | 1.3E-01 | mg/kg | NA | | NA | | NA | 6.9E-07 | mg/kg/day | 2.0E-05 | mg/kg/day | 3.5E-02 | |
| | | | Aroclor-1260 | 1.4E-01 | mg/kg | NA | | NA | | NA | 7.1E-07 | mg/kg/day | NA | mg/kg/day | NA | |
| | | | Dieldrin | 1.4E-02 | mg/kg | NA | | NA | | NA | 5.3E-08 | mg/kg/day | 5.0E-05 | mg/kg/day | 1.1E-03 | |

TABLE 7.8.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | | | | |
|--------|-----------------|----------------|----------------|-------------------------------|---------------------|------------|-------------------------------|---------|---------------|-------|--------------------------------|--|-----------|---------|--|-----------|---------|---------|---------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RFC | | | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | | |
| | | | | Aluminum | 1.3E+04 | mg/kg | NA | | NA | | NA | 5.0E-03 | mg/kg/day | 1.0E+00 | mg/kg/day | 5.0E-03 | | | |
| | | | | Antimony | 2.4E+00 | mg/kg | NA | | NA | | NA | 9.1E-07 | mg/kg/day | 6.0E-05 | mg/kg/day | 1.5E-02 | | | |
| | | | | Arsenic | 2.2E+01 | mg/kg | NA | | NA | | NA | 2.5E-05 | mg/kg/day | 3.0E-04 | mg/kg/day | 8.2E-02 | | | |
| | | | | Barium | 1.2E+02 | mg/kg | NA | | NA | | NA | 4.5E-05 | mg/kg/day | 1.4E-02 | mg/kg/day | 3.2E-03 | | | |
| | | | | Cadmium | 7.1E+00 | mg/kg | NA | | NA | | NA | 2.7E-07 | mg/kg/day | 2.5E-05 | mg/kg/day | 1.1E-02 | | | |
| | | | | Chromium | 2.4E+01 | mg/kg | NA | | NA | | NA | 8.9E-06 | mg/kg/day | 7.5E-05 | mg/kg/day | 1.2E-01 | | | |
| | | | | Cobalt | 2.2E+00 | mg/kg | NA | | NA | | NA | 8.1E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.7E-03 | | | |
| | | | | Copper | 3.5E+01 | mg/kg | NA | | NA | | NA | 1.3E-05 | mg/kg/day | 4.0E-02 | mg/kg/day | 3.2E-04 | | | |
| | | | | Iron | 1.1E+04 | mg/kg | NA | | NA | | NA | 4.2E-03 | mg/kg/day | 7.0E-01 | mg/kg/day | 6.0E-03 | | | |
| | | | | Lead | 1.5E+02 | mg/kg | NA | | NA | | NA | 5.6E-05 | mg/kg/day | NA | mg/kg/day | NA | | | |
| | | | | Manganese | 1.0E+02 | mg/kg | NA | | NA | | NA | 3.9E-05 | mg/kg/day | 5.6E-03 | mg/kg/day | 6.9E-03 | | | |
| | | | | Mercury | 3.7E+00 | mg/kg | NA | | NA | | NA | 1.4E-06 | mg/kg/day | 2.1E-05 | mg/kg/day | 6.6E-02 | | | |
| | | | | Thallium | 1.2E+00 | mg/kg | NA | | NA | | NA | 4.5E-07 | mg/kg/day | NA | mg/kg/day | NA | | | |
| | | | | Vanadium | 3.7E+01 | mg/kg | NA | | NA | | NA | 1.4E-05 | mg/kg/day | 1.3E-04 | mg/kg/day | 1.1E-01 | | | |
| | | | | Zinc | 8.1E+02 | mg/kg | NA | | NA | | NA | 3.0E-04 | mg/kg/day | 3.0E-01 | mg/kg/day | 1.0E-03 | | | |
| | | | | Exp. Route Total | | | | | | | | 0.0E+00 | | | | 4.6E-01 | | | |
| | | | | Exposure Point Total | | | | | | | | 0.0E+00 | | | | 2.6E+00 | | | |
| | | | | Exposure Medium Total | | | | | | | | 0.0E+00 | | | | 2.6E+00 | | | |
| | | | | Air | Emissions from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | NA | | NA | | NA | 1.8E-08 | mg/kg/day | 1.0E-04 | mg/m³ | 1.8E-04 |
| | | | | | | | Exp. Route Total | | | | | | 0.0E+00 | | | | | 1.8E-04 | |
| | | | | | | | Exposure Point Total | | | | | | 0.0E+00 | | | | | 1.8E-04 | |
| | | | | | | | Exposure Medium Total | | | | | | 0.0E+00 | | | | | 1.8E-04 | |
| | | | | | | | Soil Total | | | | | | 0.0E+00 | | | | | 2.6E+00 | |
| | | | | | | | | | | | | Total of Receptor Risks Across All Media | 0.0E+00 | | Total of Receptor Hazards Across All Media | 2.6E+00 | | | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | |
|------------|-----------------|----------------|--------------------------------|-------------------------------------|---------|-------|-------------------------------|-----------|---------------|-------------|--------------------------------|-------------------------------|-------|--------|-----------------|----|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/IC | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene ¹ | 1.6E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 7.9E-07 | NA | | NA | | NA |
| | | | | Benzo(a)pyrene ¹ | 2.2E-01 | mg/kg | | | 7.3E+00 | 1/mg/kg-day | 1.1E-05 | NA | | NA | | NA |
| | | | | Benzo(b)fluoranthene ¹ | 4.1E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 2.0E-06 | NA | | NA | | NA |
| | | | | Benzo(k)fluoranthene ¹ | 3.4E-01 | mg/kg | | | 7.3E-02 | 1/mg/kg-day | 1.7E-07 | NA | | NA | | NA |
| | | | | Chrysene ¹ | 2.6E-01 | mg/kg | | | 7.3E-03 | 1/mg/kg-day | 1.3E-08 | NA | | NA | | NA |
| | | | | Dibenz(a,h)anthracene ¹ | 4.8E-02 | mg/kg | | | 7.3E+00 | 1/mg/kg-day | 2.4E-06 | NA | | NA | | NA |
| | | | | Indeno(1,2,3-cd)pyrene ¹ | 1.2E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 5.8E-07 | NA | | NA | | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 2.1E-07 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 4.2E-07 | NA | | NA | | NA |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 2.1E-07 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 4.2E-07 | NA | | NA | | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 2.2E-08 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 3.6E-07 | NA | | NA | | NA |
| | | | | Aluminum | 1.3E+04 | mg/kg | 2.1E-02 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Antimony | 2.4E+00 | mg/kg | 3.8E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Arsenic | 2.2E+01 | mg/kg | 3.4E-05 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 5.1E-05 | NA | | NA | | NA |
| | | | | Barium | 1.2E+02 | mg/kg | 1.9E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Cadmium | 7.1E+00 | mg/kg | 1.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Chromium ¹ | 2.4E+01 | mg/kg | | | 5.0E-01 | 1/mg/kg-day | 4.1E-05 | NA | | NA | | NA |
| | | | | Cobalt | 2.2E+00 | mg/kg | 3.4E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Copper | 3.5E+01 | mg/kg | 5.4E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Iron | 1.1E+04 | mg/kg | 1.7E-02 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Lead | 1.5E+02 | mg/kg | 2.3E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Manganese | 1.0E+02 | mg/kg | 1.6E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Mercury | 3.7E+00 | mg/kg | 5.8E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Thallium | 1.2E+00 | mg/kg | 1.9E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Vanadium | 3.7E+01 | mg/kg | 5.9E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | | Zinc | 8.1E+02 | mg/kg | 1.3E-03 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |
| | | | Exp. Route Total | | | | | | | | 1.1E-04 | | | | 0.0E+00 | |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene ¹ | 1.6E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 2.0E-06 | NA | | NA | | NA |
| | | | | Benzo(a)pyrene ¹ | 2.2E-01 | mg/kg | | | 7.3E+00 | 1/mg/kg-day | 2.8E-05 | NA | | NA | | NA |
| | | | | Benzo(b)fluoranthene ¹ | 4.1E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 5.1E-06 | NA | | NA | | NA |
| | | | | Benzo(k)fluoranthene ¹ | 3.4E-01 | mg/kg | | | 7.3E-02 | 1/mg/kg-day | 4.2E-07 | NA | | NA | | NA |
| | | | | Chrysene ¹ | 2.6E-01 | mg/kg | | | 7.3E-03 | 1/mg/kg-day | 3.2E-08 | NA | | NA | | NA |
| | | | | Dibenz(a,h)anthracene ¹ | 4.8E-02 | mg/kg | | | 7.3E+00 | 1/mg/kg-day | 6.0E-06 | NA | | NA | | NA |
| | | | | Indeno(1,2,3-cd)pyrene ¹ | 1.2E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 1.5E-06 | NA | | NA | | NA |
| | | | | Aroclor-1254 | 1.3E-01 | mg/kg | 9.2E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.8E-07 | NA | | NA | | NA |
| | | | | Aroclor-1260 | 1.4E-01 | mg/kg | 9.3E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.9E-07 | NA | | NA | | NA |
| | | | | Dieldrin | 1.4E-02 | mg/kg | 7.1E-09 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 1.1E-07 | NA | | NA | | NA |
| | | | | Aluminum | 1.3E+04 | mg/kg | 6.6E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA |

TABLE 7.9.RME
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | | Hazard Quotient |
|--------|--|---------------------|----------------|-------------------------------|---------|-------------------|-------------------------------|-----------|---------------|-------------------|-------------|--------------------------------|--|---------|-------|---------|-----------------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RIC | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | |
| | | | | Antimony | 2.4E+00 | mg/kg | 1.2E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Arsenic | 2.2E+01 | mg/kg | 3.3E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 4.9E-06 | NA | | NA | | NA | |
| | | | | Barium | 1.2E+02 | mg/kg | 6.0E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Cadmium | 7.1E+00 | mg/kg | 3.5E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Chromium ¹ | 2.4E+01 | mg/kg | | | 1.3E-02 | 1/mg/kg-day | 3.9E-07 | NA | | NA | | NA | |
| | | | | Cobalt | 2.2E+00 | mg/kg | 1.1E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Copper | 3.5E+01 | mg/kg | 1.7E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Iron | 1.1E+04 | mg/kg | 5.5E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Lead | 1.5E+02 | mg/kg | 7.4E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Manganese | 1.0E+02 | mg/kg | 5.1E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Mercury | 3.7E+00 | mg/kg | 1.8E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Thallium | 1.2E+00 | mg/kg | 5.9E-08 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Vanadium | 3.7E+01 | mg/kg | 1.9E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Zinc | 8.1E+02 | mg/kg | 4.0E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | |
| | | | | Exp. Route Total | | | | | | | 4.9E-05 | | | | | 0.0E+00 | |
| | | | | Exposure Point Total | | | | | | | 1.6E-04 | | | | | 0.0E+00 | |
| | Exposure Medium Total | | | | | | | | | | 1.6E-04 | | | | | 0.0E+00 | |
| | Air | Emissions from Soil | Inhalation | Chromium ¹ | 1.8E-05 | µg/m ³ | | | 8.4E+01 | mg/m ³ | 5.9E-08 | NA | | NA | | NA | |
| | | | | Exp. Route Total | | | | | | | 5.9E-08 | | | | | 0.0E+00 | |
| | Soil Total | | | | | | | | | | 1.6E-04 | | | | | 0.0E+00 | |
| | Total of Receptor Risks Across All Media | | | | | | | | | | 1.6E-04 | | Total of Receptor Hazards Across All Media | | | 0.0E+00 | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.9.RME Supplement A
CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Current |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | | | | | | Cancer Risk | | |
|--------|--------------------|----------------|----------------|-------------------------------|---------|---------|--------------------------|---------|------------|-----------|---------------|----------------------|---------------------|----------------------|-----------------------|---------------|---------|-------------|--|--|
| | | | | | Value | Units | Intake | | | | CSF/Unit Risk | | | | Units | | | | | |
| | | | | | | | 0-2 yrs | 2-6 yrs | 6-16 years | 16-30 yrs | Value | 0-2 yrs (ADAF=10) | 2-6 yrs (ADAF=3) | 6-16 yrs (ADAF=3) | 16-30 yrs (ADAF=1) | | | | | |
| Soil | Soil | Soil | Ingestion | Benzo(a)anthracene | 1.6E-01 | mg/kg | 5.9E-08 | 1.2E-07 | 3.2E-08 | 4.4E-08 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 7.9E-07 | | | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 8.2E-08 | 1.6E-07 | 4.4E-08 | 6.1E-08 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 1.1E-05 | | | |
| | | | | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 1.5E-07 | 3.0E-07 | 8.1E-08 | 1.1E-07 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 2.0E-06 | | | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 1.2E-07 | 2.5E-07 | 6.6E-08 | 9.2E-08 | mg/kg/day | 7.3E-01 | 2.2E-01 | 2.2E-01 | 7.3E-02 | 1/(mg/kg-day) | 1.7E-07 | | | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 9.5E-08 | 1.9E-07 | 5.1E-08 | 7.1E-08 | mg/kg/day | 7.3E-02 | 2.2E-02 | 2.2E-02 | 7.3E-03 | 1/(mg/kg-day) | 1.3E-08 | | | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 1.8E-08 | 3.5E-08 | 9.4E-09 | 1.3E-08 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 2.4E-06 | | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 4.4E-08 | 8.7E-08 | 2.3E-08 | 3.3E-08 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 5.8E-07 | | | |
| | | | Dermal | Chromium | 2.4E+01 | mg/kg | 8.7E-06 | 1.7E-05 | 4.7E-06 | 6.6E-06 | mg/kg/day | 5.0E-01 | 1.5E+00 | 1.5E+00 | 5.0E-01 | 1/(mg/kg-day) | 4.1E-05 | | | |
| | | | | Benzo(a)anthracene | 1.6E-01 | mg/kg | 1.1E-07 | 2.1E-07 | 2.3E-07 | 3.3E-07 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 2.0E-06 | | | |
| | | | | Benzo(a)pyrene | 2.2E-01 | mg/kg | 1.5E-07 | 3.0E-07 | 3.2E-07 | 4.5E-07 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 2.8E-05 | | | |
| | | | Air | Benzo(b)fluoranthene | 4.1E-01 | mg/kg | 2.7E-07 | 5.5E-07 | 6.0E-07 | 8.4E-07 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 5.1E-06 | | | |
| | | | | Benzo(k)fluoranthene | 3.4E-01 | mg/kg | 2.2E-07 | 4.5E-07 | 4.9E-07 | 6.9E-07 | mg/kg/day | 7.3E-01 | 2.2E-01 | 2.2E-01 | 7.3E-02 | 1/(mg/kg-day) | 4.2E-07 | | | |
| | | | | Chrysene | 2.6E-01 | mg/kg | 1.7E-07 | 3.5E-07 | 3.8E-07 | 5.3E-07 | mg/kg/day | 7.3E-02 | 2.2E-02 | 2.2E-02 | 7.3E-03 | 1/(mg/kg-day) | 3.2E-08 | | | |
| | | | | Dibenz(a,h)anthracene | 4.8E-02 | mg/kg | 3.2E-08 | 6.4E-08 | 7.0E-08 | 9.8E-08 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 6.0E-06 | | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.2E-01 | mg/kg | 7.9E-08 | 1.6E-07 | 1.7E-07 | 2.4E-07 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 1.5E-06 | | | |
| | | | | Chromium | 2.4E+01 | mg/kg | 1.2E-06 | 2.4E-06 | 2.7E-06 | 3.7E-06 | mg/kg/day | 1.3E-01 | 3.8E-02 | 3.8E-02 | 1.3E-02 | 1/(mg/kg-day) | 3.9E-07 | | | |
| Air | Emission from Soil | Inhalation | Chromium | 1.8E-05 | µg/m³ | 2.0E-08 | 4.0E-08 | 1.0E-07 | 8.1E-08 | mg/kg/day | 8.4E-01 | 2.5E-01 | 2.5E-01 | 8.4E-02 | 1/(mg/kg-day) | 5.9E-08 | | | | |

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | | |
|------------|-----------------|----------------|--------------------------------|-------------------------------|---------|-------|-------------------------------|-------|---------------|-------|--------------------------------|-------------------------------|-----------|---------|-----------|-----------------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RIC | | Hazard Quotient |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Total Soil | Total Soil | Total Soil | Ingestion | Benzo(a)anthracene | 1.2E-01 | mg/kg | NA | | NA | | NA | 5.5E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 1.6E-01 | mg/kg | NA | | NA | | NA | 6.9E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 2.6E-01 | mg/kg | NA | | NA | | NA | 1.1E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 2.2E-01 | mg/kg | NA | | NA | | NA | 9.7E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.7E-01 | mg/kg | NA | | NA | | NA | 1.2E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.3E-02 | mg/kg | NA | | NA | | NA | 1.9E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.0E-01 | mg/kg | NA | | NA | | NA | 4.5E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.1E-01 | mg/kg | NA | | NA | | NA | 4.9E-07 | mg/kg/day | 2.0E-05 | mg/kg/day | 2.5E-02 |
| | | | | Aroclor-1260 | 9.2E-02 | mg/kg | NA | | NA | | NA | 4.1E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 6.9E-03 | mg/kg | NA | | NA | | NA | 3.1E-08 | mg/kg/day | 5.0E-05 | mg/kg/day | 6.2E-04 |
| | | | | Aluminum | 7.6E+03 | mg/kg | NA | | NA | | NA | 3.4E-02 | mg/kg/day | 1.0E+00 | mg/kg/day | 3.4E-02 |
| | | | | Antimony | 1.6E+00 | mg/kg | NA | | NA | | NA | 7.0E-06 | mg/kg/day | 4.0E-04 | mg/kg/day | 1.8E-02 |
| | | | | Arsenic | 6.6E+00 | mg/kg | NA | | NA | | NA | 2.9E-05 | mg/kg/day | 3.0E-04 | mg/kg/day | 9.8E-02 |
| | | | | Barium | 8.5E+01 | mg/kg | NA | | NA | | NA | 3.8E-04 | mg/kg/day | 2.0E-01 | mg/kg/day | 1.9E-03 |
| | | | | Cadmium | 1.8E+00 | mg/kg | NA | | NA | | NA | 8.2E-06 | mg/kg/day | 1.0E-03 | mg/kg/day | 8.2E-03 |
| | | | | Chromium | 1.8E+01 | mg/kg | NA | | NA | | NA | 8.1E-05 | mg/kg/day | 3.0E-03 | mg/kg/day | 2.7E-02 |
| | | | | Cobalt | 1.7E+00 | mg/kg | NA | | NA | | NA | 7.5E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.5E-02 |
| | | | | Copper | 2.3E+01 | mg/kg | NA | | NA | | NA | 1.0E-04 | mg/kg/day | 4.0E-02 | mg/kg/day | 2.6E-03 |
| | | | | Iron | 8.5E+03 | mg/kg | NA | | NA | | NA | 3.8E-02 | mg/kg/day | 7.0E-01 | mg/kg/day | 5.4E-02 |
| | | | | Lead | 1.2E+02 | mg/kg | NA | | NA | | NA | 5.2E-04 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Manganese | 7.5E+01 | mg/kg | NA | | NA | | NA | 3.3E-04 | mg/kg/day | 1.4E-01 | mg/kg/day | 2.4E-03 |
| | | | | Mercury | 7.1E-01 | mg/kg | NA | | NA | | NA | 3.2E-06 | mg/kg/day | 3.0E-04 | mg/kg/day | 1.1E-02 |
| | | | | Thallium | 1.1E+00 | mg/kg | NA | | NA | | NA | 4.9E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Vanadium | 2.1E+01 | mg/kg | NA | | NA | | NA | 9.3E-05 | mg/kg/day | 5.0E-03 | mg/kg/day | 1.9E-02 |
| | | | | Zinc | 4.9E+02 | mg/kg | NA | | NA | | NA | 2.2E-03 | mg/kg/day | 3.0E-01 | mg/kg/day | 7.3E-03 |
| | | | Exp. Route Total | | | | | | | | 0.0E+00 | | | | 3.3E-01 | |
| | | | Dermal Absorption ¹ | Benzo(a)anthracene | 1.2E-01 | mg/kg | NA | | NA | | NA | 8.1E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(a)pyrene | 1.6E-01 | mg/kg | NA | | NA | | NA | 1.0E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(b)fluoranthene | 2.6E-01 | mg/kg | NA | | NA | | NA | 1.7E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Benzo(k)fluoranthene | 2.2E-01 | mg/kg | NA | | NA | | NA | 1.4E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Chrysene | 2.7E-01 | mg/kg | NA | | NA | | NA | 1.8E-07 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dibenz(a,h)anthracene | 4.3E-02 | mg/kg | NA | | NA | | NA | 2.8E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Indeno(1,2,3-cd)pyrene | 1.0E-01 | mg/kg | NA | | NA | | NA | 6.5E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Aroclor-1254 | 1.1E-01 | mg/kg | NA | | NA | | NA | 7.7E-08 | mg/kg/day | 2.0E-05 | mg/kg/day | 3.9E-03 |
| | | | | Aroclor-1260 | 9.2E-02 | mg/kg | NA | | NA | | NA | 6.5E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Dieldrin | 6.9E-03 | mg/kg | NA | | NA | | NA | 3.5E-09 | mg/kg/day | 5.0E-05 | mg/kg/day | 6.9E-05 |
| | | | | Aluminum | 7.6E+03 | mg/kg | NA | | NA | | NA | 3.8E-04 | mg/kg/day | 1.0E+00 | mg/kg/day | 3.8E-04 |
| | | | | Antimony | 1.6E+00 | mg/kg | NA | | NA | | NA | 7.9E-08 | mg/kg/day | 6.0E-05 | mg/kg/day | 1.3E-03 |
| | | | | Arsenic | 6.6E+00 | mg/kg | NA | | NA | | NA | 9.9E-07 | mg/kg/day | 3.0E-04 | mg/kg/day | 3.3E-03 |
| | | | | Barium | 8.5E+01 | mg/kg | NA | | NA | | NA | 4.2E-06 | mg/kg/day | 1.4E-02 | mg/kg/day | 3.0E-04 |
| | | | | Cadmium | 1.8E+00 | mg/kg | NA | | NA | | NA | 9.1E-09 | mg/kg/day | 2.5E-05 | mg/kg/day | 3.7E-04 |
| | | | | Chromium | 1.8E+01 | mg/kg | NA | | NA | | NA | 9.0E-07 | mg/kg/day | 7.5E-05 | mg/kg/day | 1.2E-02 |
| | | | | Cobalt | 1.7E+00 | mg/kg | NA | | NA | | NA | 8.4E-08 | mg/kg/day | 3.0E-04 | mg/kg/day | 2.8E-04 |
| | | | | Copper | 2.3E+01 | mg/kg | NA | | NA | | NA | 1.2E-06 | mg/kg/day | 4.0E-02 | mg/kg/day | 2.9E-05 |
| | | | | Iron | 8.5E+03 | mg/kg | NA | | NA | | NA | 4.3E-04 | mg/kg/day | 7.0E-01 | mg/kg/day | 6.1E-04 |

TABLE 7.1.CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
CENTRAL TENDENCY EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | |
|------------|-----------------|----------------|-----------------------|-------------------------------|---------|-------|--|-------|---------------|-------|--------------------------------|--|-----------|---------|-----------------|---------|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| | | | | Lead | 1.2E+02 | mg/kg | NA | | NA | | NA | 5.9E-06 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Manganese | 7.5E+01 | mg/kg | NA | | NA | | NA | 3.7E-06 | mg/kg/day | 5.6E-03 | mg/kg/day | 6.6E-04 |
| | | | | Mercury | 7.1E-01 | mg/kg | NA | | NA | | NA | 3.5E-08 | mg/kg/day | 2.1E-05 | mg/kg/day | 1.7E-03 |
| | | | | Thallium | 1.1E+00 | mg/kg | NA | | NA | | NA | 5.5E-08 | mg/kg/day | NA | mg/kg/day | NA |
| | | | | Vanadium | 2.1E+01 | mg/kg | NA | | NA | | NA | 1.0E-06 | mg/kg/day | 1.3E-04 | mg/kg/day | 8.0E-03 |
| | | | | Zinc | 4.9E+02 | mg/kg | NA | | NA | | NA | 2.4E-05 | mg/kg/day | 3.0E-01 | mg/kg/day | 8.1E-05 |
| | | | Exp. Route Total | | | | | | | | | 0.0E+00 | | | | 3.3E-02 |
| | | | Exposure Point Total | | | | | | | | | 0.0E+00 | | | | 3.7E-01 |
| | | | Exposure Medium Total | | | | | | | | | 0.0E+00 | | | | 3.7E-01 |
| Soil Total | | | | | | | | | | | | 0.0E+00 | | | | 3.7E-01 |
| | | | | | | | Total of Receptor Risks Across All Media | | 0.0E+00 | | | Total of Receptor Hazards Across All Media | | | | 3.7E-01 |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

TABLE 7.2. CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | Non-Cancer Hazard Calculations | | | | Hazard Quotient | |
|------------|-----------------|----------------|-------------------------------------|-------------------------------|---------------------------------|---------|-------------------------------|---------|---------------|---------|--------------------------------|-------------------------------|-------|---------|-----------------|----|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | |
| Total Soil | Total Soil | Ingestion | Benzo(a)anthracene ¹ | 1.2E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 3.6E-07 | NA | | | NA | | NA |
| | | | | 1.6E-01 | mg/kg | | | 7.3E+00 | 1/mg/kg-day | 2.5E-06 | NA | | | NA | | NA |
| | | | Benzo(b)fluoranthene ¹ | 2.6E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 7.5E-07 | NA | | | NA | | NA |
| | | | | 2.2E-01 | mg/kg | | | 7.3E-02 | 1/mg/kg-day | 6.4E-08 | NA | | | NA | | NA |
| | | | Chrysene ¹ | 2.7E-01 | mg/kg | | | 7.3E-03 | 1/mg/kg-day | 6.4E-08 | NA | | | NA | | NA |
| | | | | 4.3E-02 | mg/kg | | | 7.3E+00 | 1/mg/kg-day | 1.3E-06 | NA | | | NA | | NA |
| | | | Indeno(1,2,3-cd)pyrene ¹ | 1.0E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 2.9E-07 | NA | | | NA | | NA |
| | | | | 1.1E-01 | mg/kg | 4.7E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 9.3E-08 | NA | | | NA | | NA |
| | | | Aroclor-1254 | 9.2E-02 | mg/kg | 3.9E-08 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 7.8E-08 | NA | | | NA | | NA |
| | | | | 6.9E-03 | mg/kg | 2.9E-09 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 4.7E-08 | NA | | | NA | | NA |
| | | | Dieldrin | 7.6E+03 | mg/kg | 3.2E-03 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | 1.6E+00 | mg/kg | 6.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | Antimony | 6.6E+00 | mg/kg | 2.8E-06 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 4.2E-06 | NA | | | NA | | NA |
| | | | | 8.5E+01 | mg/kg | 3.6E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | Barium | 1.8E+00 | mg/kg | 7.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | 1.8E+01 | mg/kg | 5.0E-01 | 1/mg/kg-day | 3.6E-05 | NA | | NA | | | NA | | NA |
| | | | Cadmium | 1.7E+00 | mg/kg | 7.1E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | 2.3E+01 | mg/kg | 9.7E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | Iron | 8.5E+03 | mg/kg | 3.6E-03 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | 1.2E+02 | mg/kg | 5.0E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | Lead | 7.5E+01 | mg/kg | 3.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | 7.1E-01 | mg/kg | 3.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | Manganese | 1.1E+00 | mg/kg | 4.7E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | 2.1E+01 | mg/kg | 8.8E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | Zinc | 4.9E+02 | mg/kg | 2.1E-04 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | Exp. Route Total | | | | | | 4.6E-05 | | | | | 0.0E+00 | |
| | | | Dermal Absorption ¹ | Dermal | Benzo(a)anthracene ¹ | 1.2E-01 | mg/kg | | | 7.3E-01 | 1/mg/kg-day | 1.0E-06 | NA | | NA | NA |
| | | | | 1.6E-01 | mg/kg | 7.3E+00 | 1/mg/kg-day | 1.3E-05 | NA | | | NA | | NA | NA | |
| | | | | 2.6E-01 | mg/kg | 7.3E-01 | 1/mg/kg-day | 2.1E-06 | NA | | | NA | | NA | NA | |
| | | | | 2.2E-01 | mg/kg | 7.3E-02 | 1/mg/kg-day | 1.8E-07 | NA | | | NA | | NA | NA | |
| | | | | 2.7E-01 | mg/kg | 7.3E-03 | 1/mg/kg-day | 1.8E-07 | NA | | | NA | | NA | NA | |
| | | | | 4.3E-02 | mg/kg | 7.3E+00 | 1/mg/kg-day | 3.6E-06 | NA | | | NA | | NA | NA | |
| | | | | 1.0E-01 | mg/kg | 7.3E-01 | 1/mg/kg-day | 8.3E-07 | NA | | | NA | | NA | NA | |
| | | | | 1.1E-01 | mg/kg | 7.4E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.5E-08 | NA | | | NA | | NA |
| | | | | 9.2E-02 | mg/kg | 6.2E-09 | mg/kg/day | 2.0E+00 | 1/mg/kg-day | 1.2E-08 | NA | | | NA | | NA |
| | | | | 6.9E-03 | mg/kg | 3.3E-10 | mg/kg/day | 1.6E+01 | 1/mg/kg-day | 5.3E-09 | NA | | | NA | | NA |
| | | | | 7.6E+03 | mg/kg | 3.6E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |
| | | | | 1.6E+00 | mg/kg | 7.5E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | | NA | | NA |

TABLE 7.2. CTE
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Future |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | Non-Cancer Hazard Calculations | | | | | Hazard Quotient | | |
|--------|-----------------|----------------|--|-------------------------------|------------|-----------------------|-------------------------------|-------------------|---------------|-------------|-------------|--------------------------------|---------|---------|---------|--|-----------------|--|--|
| | | | | | Value | Units | Intake/Exposure Concentration | | CSF/Unit Risk | | Cancer Risk | Intake/Exposure Concentration | | RfD/RfC | | | | | |
| | | | | | | | Value | Units | Value | Units | | Value | Units | Value | Units | | | | |
| | | | | Arsenic | 6.6E+00 | mg/kg | 9.5E-08 | mg/kg/day | 1.5E+00 | 1/mg/kg-day | 1.4E-07 | NA | | NA | | NA | | | |
| | | | | Barium | 8.5E+01 | mg/kg | 4.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Cadmium | 1.8E+00 | mg/kg | 8.7E-10 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Chromium ¹ | 1.8E+01 | mg/kg | | | 1.3E-02 | 1/mg/kg-day | 2.0E-07 | NA | | NA | | NA | | | |
| | | | | Cobalt | 1.7E+00 | mg/kg | 8.0E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Copper | 2.3E+01 | mg/kg | 1.1E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Iron | 8.5E+03 | mg/kg | 4.1E-05 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Lead | 1.2E+02 | mg/kg | 5.6E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Manganese | 7.5E+01 | mg/kg | 3.5E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Mercury | 7.1E-01 | mg/kg | 3.4E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Thallium | 1.1E+00 | mg/kg | 5.3E-09 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Vanadium | 2.1E+01 | mg/kg | 1.0E-07 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Zinc | 4.9E+02 | mg/kg | 2.3E-06 | mg/kg/day | NA | 1/mg/kg-day | NA | NA | | NA | | NA | | | |
| | | | | Exp. Route Total | | | | | | | 2.1E-05 | | | | | 0.0E+00 | | | |
| | | | | Exposure Point Total | | | | | | | 6.7E-05 | | | | | 0.0E+00 | | | |
| | | | | Exposure Medium Total | | | | | | | 6.7E-05 | | | | | 0.0E+00 | | | |
| | | | Air | Emissions from Soil | Inhalation | Chromium ¹ | 1.8E-05 | µg/m ³ | | | 8.4E+01 | mg/m ³ | 4.0E-08 | NA | | NA | NA | | |
| | | | | Exp. Route Total | | | | | | | 4.0E-08 | | | | | 0.0E+00 | | | |
| | | | Soil Total | | | | | | | | 6.7E-05 | | | | | 0.0E+00 | | | |
| | | | Total of Receptor Risks Across All Media | | | | | | | | | | | | 6.7E-05 | Total of Receptor Hazards Across All Media | 0.0E+00 | | |

Notes:

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: PCBs - 0.14; Arsenic - 0.03; Cadmium - 0.001, other metals - 0.01, pesticides - 0.1; PAHs - 0.13.

NA = Not available/not applicable

1. See Table 7.9.RME Supplement A for calculation of cancer intake and cancer risk following MMOA method.

TABLE 7.2.CTE Supplement B
 CALCULATION OF CHEMICAL CANCER RISKS FOR COPC WITH MUTAGENIC MODE OF ACTION
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|-------------------------------|
| Scenario Timeframe: Current |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Exposure Route | Chemical of Potential Concern | EPC | | Cancer Risk Calculations | | | | | | | | | | | Cancer Risk | | |
|--------|-----------------|----------------|----------------|-------------------------------|---------|-------|--------------------------|---------|------------|-----------|---------------|----------------------|---------------------|----------------------|-----------------------|---------------|---------|-------------|--|--|
| | | | | | Value | Units | Intake | | | | CSF/Unit Risk | | | | Units | | | | | |
| | | | | | | | 0-2 yrs | 2-6 yrs | 6-16 years | 16-30 yrs | Value | 0-2 yrs (ADAF=10) | 2-6 yrs (ADAF=3) | 6-16 yrs (ADAF=3) | 16-30 yrs (ADAF=1) | | | | | |
| Soil | Soil | Soil | Ingestion | Benzo(a)anthracene | 1.2E-01 | mg/kg | 1.5E-08 | 3.0E-08 | 8.1E-08 | 1.1E-08 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 3.6E-07 | | | |
| | | | | Benzo(a)pyrene | 1.6E-01 | mg/kg | 1.9E-08 | 3.8E-08 | 1.0E-08 | 1.4E-08 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 2.5E-06 | | | |
| | | | | Benzo(b)fluoranthene | 2.6E-01 | mg/kg | 3.1E-08 | 6.3E-08 | 1.7E-07 | 2.4E-08 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 7.5E-07 | | | |
| | | | | Benzo(k)fluoranthene | 2.2E-01 | mg/kg | 2.7E-08 | 5.3E-08 | 1.4E-07 | 2.0E-08 | mg/kg/day | 7.3E-01 | 2.2E-01 | 2.2E-01 | 7.3E-02 | 1/(mg/kg-day) | 6.4E-08 | | | |
| | | | | Chrysene | 2.7E-01 | mg/kg | 3.3E-08 | 6.6E-08 | 1.8E-07 | 2.5E-08 | mg/kg/day | 7.3E-02 | 2.2E-02 | 2.2E-02 | 7.3E-03 | 1/(mg/kg-day) | 8.0E-09 | | | |
| | | | | Dibenz(a,h)anthracene | 4.3E-02 | mg/kg | 5.3E-09 | 1.1E-08 | 2.8E-08 | 3.9E-09 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 1.3E-06 | | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.0E-01 | mg/kg | 1.2E-08 | 2.5E-08 | 6.6E-08 | 9.2E-09 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 2.9E-07 | | | |
| | | | Dermal | Chromium | 1.8E+01 | mg/kg | 2.2E-06 | 4.4E-06 | 1.2E-05 | 1.7E-06 | mg/kg/day | 5.0E+00 | 1.5E+00 | 1.5E+00 | 5.0E-01 | 1/(mg/kg-day) | 3.6E-05 | | | |
| | | | | Benzo(a)anthracene | 1.2E-01 | mg/kg | 5.5E-08 | 1.1E-07 | 1.2E-07 | 1.7E-07 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 1.0E-06 | | | |
| | | | | Benzo(a)pyrene | 1.6E-01 | mg/kg | 6.9E-08 | 1.4E-07 | 1.5E-07 | 2.1E-07 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 1.3E-05 | | | |
| | | | Air | Benzo(b)fluoranthene | 2.6E-01 | mg/kg | 1.1E-07 | 2.3E-07 | 2.5E-07 | 3.5E-07 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 2.1E-06 | | | |
| | | | | Benzo(k)fluoranthene | 2.2E-01 | mg/kg | 9.6E-08 | 1.9E-07 | 2.1E-07 | 2.9E-07 | mg/kg/day | 7.3E-01 | 2.2E-01 | 2.2E-01 | 7.3E-02 | 1/(mg/kg-day) | 1.8E-07 | | | |
| | | | | Chrysene | 2.7E-01 | mg/kg | 1.2E-07 | 2.4E-07 | 2.6E-07 | 3.7E-07 | mg/kg/day | 7.3E-02 | 2.2E-02 | 2.2E-02 | 7.3E-03 | 1/(mg/kg-day) | 2.3E-08 | | | |
| | | | | Dibenz(a,h)anthracene | 4.3E-02 | mg/kg | 1.9E-08 | 3.8E-08 | 4.2E-08 | 5.8E-08 | mg/kg/day | 7.3E+01 | 2.2E+01 | 2.2E+01 | 7.3E+00 | 1/(mg/kg-day) | 3.6E-06 | | | |
| | | | | Indeno(1,2,3-cd)pyrene | 1.0E-01 | mg/kg | 4.5E-08 | 8.9E-08 | 9.7E-08 | 1.4E-07 | mg/kg/day | 7.3E+00 | 2.2E+00 | 2.2E+00 | 7.3E-01 | 1/(mg/kg-day) | 8.3E-07 | | | |
| | | | | Chromium | 1.8E+01 | mg/kg | 6.2E-07 | 1.2E-06 | 1.3E-06 | 1.9E-06 | mg/kg/day | 1.3E-01 | 3.8E-02 | 3.8E-02 | 1.3E-02 | 1/(mg/kg-day) | 2.0E-07 | | | |

1. Dermal absorption factors (DABs) used to calculate dermal absorption intake from soil are chemical specific: chromium - 0.01, PAHs - 0.13.

TABLE 9.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Current/Future |
| Receptor Population: Industrial Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|------------|---------------------|----------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|---------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 4.1E-08 | NA | 3.5E-08 | 7.7E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 5.7E-07 | NA | 4.9E-07 | 1.1E-06 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 1.1E-07 | NA | 9.0E-08 | 2.0E-07 | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | 8.6E-09 | NA | 7.4E-09 | 1.6E-08 | NA | NA | NA | NA | NA |
| | | | Chrysene | 6.6E-10 | NA | 6.1E-10 | 1.3E-09 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 1.2E-07 | NA | 1.1E-07 | 2.3E-07 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 3.0E-08 | NA | 2.8E-08 | 5.9E-08 | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | 9.3E-08 | NA | 8.6E-08 | 1.8E-07 | Finger nails, Eyes | 6.5E-03 | NA | 6.0E-03 | 1.3E-02 |
| | | | Aroclor-1260 | 9.4E-08 | NA | 6.2E-08 | 1.6E-07 | NA | NA | NA | NA | NA |
| | | | Dieldrin | 8.0E-08 | NA | 6.9E-08 | 1.5E-07 | Liver | 2.8E-04 | NA | 2.4E-04 | 5.2E-04 |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 1.3E-02 | NA | 8.6E-04 | 1.4E-02 |
| | | | Antimony | NA | NA | NA | NA | Blood | 5.9E-03 | NA | 2.6E-03 | 8.6E-03 |
| | | | Arsenic | 1.1E-05 | NA | 2.3E-06 | 1.4E-05 | Skin, Vascular | 7.1E-02 | NA | 1.4E-02 | 8.6E-02 |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 5.9E-04 | NA | 5.6E-04 | 1.2E-03 |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 7.0E-03 | NA | 1.8E-03 | 8.8E-03 |
| | | | Chromium | 4.2E-06 | NA | 6.9E-09 | 4.2E-06 | NOE | 7.8E-03 | NA | 2.1E-02 | 2.8E-02 |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 7.1E-03 | NA | 4.7E-04 | 7.5E-03 |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 8.5E-04 | NA | 5.6E-05 | 9.0E-04 |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 1.6E-02 | NA | 1.0E-03 | 1.7E-02 |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA | CNS | 7.2E-04 | NA | 1.2E-03 | 1.9E-03 |
| | | | Mercury | NA | NA | NA | NA | Immune system | 1.2E-02 | NA | 1.1E-02 | 2.3E-02 |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 7.3E-03 | NA | 1.9E-02 | 2.6E-02 |
| | | | Zinc | NA | NA | NA | NA | Blood | 2.6E-03 | NA | 1.7E-04 | 2.8E-03 |
| | | | Chemical Total | 1.7E-05 | 0.0E+00 | 3.3E-06 | 2.0E-05 | | 1.6E-01 | 0.0E+00 | 8.0E-02 | 2.4E-01 |
| | | | Exposure Point Total | | | | 2.0E-05 | | | | | 2.4E-01 |
| | | | Exposure Medium Total | | | | 2.0E-05 | | | | | 2.4E-01 |
| Air | Emissions from Soil | Chromium | NA | 1.2E-07 | NA | 1.2E-07 | Respiratory System | NA | 4.1E-05 | NA | 4.1E-05 | |
| | | | Chemical Total | 0.0E+00 | 1.2E-07 | 0.0E+00 | 1.2E-07 | | 0.0E+00 | 4.1E-05 | 0.0E+00 | 4.1E-05 |

TABLE 9.1.RME
 SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Current/Future |
| Receptor Population: Industrial Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|--------|-----------------------|----------------------------------|-------------------|------------|--------|-----------------------|--|--|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | | | |
| | | Exposure Point Total | | | | | | 1.2E-07 | | | | | | | |
| | | Exposure Medium Total | | | | | | 1.2E-07 | | | | | | | |
| Medium Total | | | | | | | | 2.0E-05 | | | | | | | |
| Receptor Total | | | | | | | | 2.0E-05 | Receptor HI Total | | | | | | |

HI = Hazard Index

NA = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

| | |
|---|---------|
| Total Fingernails HI Across All Media = | 1.3E-02 |
| Total Eyes HI Across All Media = | 1.3E-02 |
| Total Liver HI Across All Media = | 5.2E-04 |

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Maintenance Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|------------|---------------------|----------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|---------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 8.6E-09 | NA | 7.4E-09 | 1.6E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 1.2E-07 | NA | 1.0E-07 | 2.2E-07 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 2.2E-08 | NA | 1.9E-08 | 4.1E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | 1.8E-09 | NA | 1.5E-09 | 3.3E-09 | NA | NA | NA | NA | NA |
| | | | Chrysene | 1.4E-10 | NA | 1.3E-10 | 2.7E-10 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 2.6E-08 | NA | 2.2E-08 | 4.8E-08 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 6.3E-09 | NA | 5.9E-09 | 1.2E-08 | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | 1.9E-08 | NA | 1.8E-08 | 3.7E-08 | Finger nails, Eyes | 1.4E-03 | NA | 1.2E-03 | 2.6E-03 |
| | | | Aroclor-1260 | 2.0E-08 | NA | 1.3E-08 | 3.3E-08 | NA | NA | NA | NA | NA |
| | | | Dieldrin | 1.7E-08 | NA | 1.4E-08 | 3.1E-08 | Liver | 5.8E-05 | NA | 5.0E-05 | 1.1E-04 |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 2.7E-03 | NA | 1.8E-04 | 2.9E-03 |
| | | | Antimony | NA | NA | NA | NA | Blood | 1.2E-03 | NA | 5.4E-04 | 1.8E-03 |
| | | | Arsenic | 2.4E-06 | NA | 4.7E-07 | 2.9E-06 | Skin, Vascular | 1.5E-02 | NA | 2.9E-03 | 1.8E-02 |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 1.2E-04 | NA | 1.2E-04 | 2.4E-04 |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 1.4E-03 | NA | 3.8E-04 | 1.8E-03 |
| | | | Chromium | 8.7E-07 | NA | 1.4E-09 | 8.7E-07 | NOE | 1.6E-03 | NA | 4.3E-03 | 5.9E-03 |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 1.5E-03 | NA | 9.7E-05 | 1.6E-03 |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 1.8E-04 | NA | 1.2E-05 | 1.9E-04 |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 3.2E-03 | NA | 2.1E-04 | 3.5E-03 |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA | CNS | 1.5E-04 | NA | 2.5E-04 | 4.0E-04 |
| | | | Mercury | NA | NA | NA | NA | Immune system | 2.5E-03 | NA | 2.4E-03 | 4.9E-03 |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 1.5E-03 | NA | 3.9E-03 | 5.4E-03 |
| | | | Zinc | NA | NA | NA | NA | Blood | 5.5E-04 | NA | 3.6E-05 | 5.9E-04 |
| | | | Chemical Total | 3.5E-06 | 0.0E+00 | 6.8E-07 | 4.2E-06 | | 3.3E-02 | 0.0E+00 | 1.7E-02 | 5.0E-02 |
| | | | Exposure Point Total | | | | 4.2E-06 | | | | | 5.0E-02 |
| | | | Exposure Medium Total | | | | 4.2E-06 | | | | | 5.0E-02 |
| Air | Emissions from Soil | Chromium | NA | 2.6E-08 | NA | 2.6E-08 | Respiratory System | NA | 8.6E-06 | NA | 8.6E-06 | |
| | | | Chemical Total | 0.0E+00 | 2.6E-08 | 0.0E+00 | 2.6E-08 | | 0.0E+00 | 8.6E-06 | 0.0E+00 | 8.6E-06 |

TABLE 9.2.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Maintenance Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|--------|-----------------------|----------------------------------|-----------|------------|--------|-----------------------|---------|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| | | Exposure Point Total | | | | | | 2.6E-08 | | | | 8.6E-06 | | |
| | | Exposure Medium Total | | | | | | | 2.6E-08 | | | | 8.6E-06 | |
| Medium Total | | | | | | | | 4.2E-06 | | | | 5.0E-02 | | |
| Receptor Total | | | | | | | | 4.2E-06 | | | | Receptor HI Total | 5.0E-02 | |

HI = Hazard Index

NA = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

| | |
|---|---------|
| Total Fingernails HI Across All Media = | 2.6E-03 |
| Total Eyes HI Across All Media = | 2.6E-03 |
| Total Liver HI Across All Media = | 1.1E-04 |

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|------------|---------------------|----------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|---------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 8.2E-09 | NA | 4.3E-09 | 1.2E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 1.1E-07 | NA | 5.9E-08 | 1.7E-07 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 2.1E-08 | NA | 1.1E-08 | 3.2E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | 1.7E-09 | NA | 8.9E-10 | 2.6E-09 | NA | NA | NA | NA | NA |
| | | | Chrysene | 1.3E-10 | NA | 6.9E-11 | 2.0E-10 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 2.5E-08 | NA | 1.3E-08 | 3.7E-08 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 6.1E-09 | NA | 3.2E-09 | 9.2E-09 | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | 1.9E-08 | NA | 1.0E-08 | 2.9E-08 | Finger nails, Eyes | 1.4E-03 | NA | 7.6E-04 | 2.1E-03 |
| | | | Aroclor-1260 | 1.9E-08 | NA | 1.1E-08 | 2.9E-08 | NA | NA | NA | NA | NA |
| | | | Dieldrin | 1.6E-08 | NA | 6.4E-09 | 2.2E-08 | Liver | 5.8E-05 | NA | 2.3E-05 | 8.1E-05 |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 2.7E-03 | NA | 1.1E-04 | 2.8E-03 |
| | | | Antimony | NA | NA | NA | NA | Blood | 1.2E-03 | NA | 3.3E-04 | 1.6E-03 |
| | | | Arsenic | 2.3E-06 | NA | 2.7E-07 | 2.6E-06 | Skin, Vascular | 1.5E-02 | NA | 1.8E-03 | 1.7E-02 |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 1.2E-04 | NA | 7.0E-05 | 1.9E-04 |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 1.4E-03 | NA | 2.3E-04 | 1.7E-03 |
| | | | Chromium | 8.3E-07 | NA | 8.3E-10 | 8.4E-07 | NOE | 1.6E-03 | NA | 2.6E-03 | 4.2E-03 |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 1.5E-03 | NA | 5.9E-05 | 1.5E-03 |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 1.8E-04 | NA | 7.0E-06 | 1.8E-04 |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 3.2E-03 | NA | 1.3E-04 | 3.4E-03 |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA | CNS | 1.5E-04 | NA | 1.5E-04 | 3.0E-04 |
| | | | Mercury | NA | NA | NA | NA | Immune system | 2.5E-03 | NA | 1.4E-03 | 3.9E-03 |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 1.5E-03 | NA | 2.3E-03 | 3.9E-03 |
| | | | Zinc | NA | NA | NA | NA | Blood | 5.5E-04 | NA | 2.2E-05 | 5.7E-04 |
| | | | Chemical Total | 3.4E-06 | 0.0E+00 | 3.9E-07 | 3.8E-06 | | 3.3E-02 | 0.0E+00 | 1.0E-02 | 4.3E-02 |
| | | | Exposure Point Total | | | | 3.8E-06 | | | | | 4.3E-02 |
| | | | Exposure Medium Total | | | | 3.8E-06 | | | | | 4.3E-02 |
| Air | Emissions from Soil | Chromium | NA | 6.2E-09 | NA | 6.2E-09 | Respiratory System | NA | 8.6E-06 | NA | 8.6E-06 | |
| | | | Chemical Total | 0.0E+00 | 6.2E-09 | 0.0E+00 | 6.2E-09 | | 0.0E+00 | 8.6E-06 | 0.0E+00 | 8.6E-06 |

TABLE 9.3.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|--------|-----------------------|----------------------------------|-----------|------------|--------|-----------------------|---------|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| | | Exposure Point Total | | | | | | 6.2E-09 | | | | 8.6E-06 | | |
| | | Exposure Medium Total | | | | | | | 6.2E-09 | | | | 8.6E-06 | |
| Medium Total | | | | | | | | 3.8E-06 | | | | 4.3E-02 | | |
| Receptor Total | | | | | | | | 3.8E-06 | | | | Receptor HI Total | 4.3E-02 | |

HI = Hazard Index

NA = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

| | |
|---|---------|
| Total Fingernails HI Across All Media = | 2.1E-03 |
| Total Eyes HI Across All Media = | 2.1E-03 |
| Total Liver HI Across All Media = | 8.1E-05 |

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Youth |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|------------|---------------------|----------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|---------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 5.3E-09 | NA | 2.9E-09 | 8.2E-09 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 7.4E-08 | NA | 4.0E-08 | 1.1E-07 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 1.4E-08 | NA | 7.4E-09 | 2.1E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | 1.1E-09 | NA | 6.1E-10 | 1.7E-09 | NA | NA | NA | NA | NA |
| | | | Chrysene | 8.6E-11 | NA | 4.7E-11 | 1.3E-10 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 1.6E-08 | NA | 8.7E-09 | 2.5E-08 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 3.9E-09 | NA | 2.2E-09 | 6.1E-09 | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | 1.2E-08 | NA | 7.1E-09 | 1.9E-08 | Finger nails, Eyes | 2.1E-03 | NA | 1.2E-03 | 3.3E-03 |
| | | | Aroclor-1260 | 1.2E-08 | NA | 7.2E-09 | 1.9E-08 | NA | NA | NA | NA | NA |
| | | | Dieldrin | 1.0E-08 | NA | 4.3E-09 | 1.5E-08 | Liver | 9.1E-05 | NA | 3.8E-05 | 1.3E-04 |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 4.2E-03 | NA | 1.8E-04 | 4.4E-03 |
| | | | Antimony | NA | NA | NA | NA | Blood | 1.9E-03 | NA | 5.4E-04 | 2.5E-03 |
| | | | Arsenic | 1.5E-06 | NA | 1.9E-07 | 1.7E-06 | Skin, Vascular | 2.3E-02 | NA | 2.9E-03 | 2.6E-02 |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 1.9E-04 | NA | 1.2E-04 | 3.1E-04 |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 2.3E-03 | NA | 3.8E-04 | 2.6E-03 |
| | | | Chromium | 5.4E-07 | NA | 5.7E-10 | 5.4E-07 | NOE | 2.5E-03 | NA | 4.2E-03 | 6.8E-03 |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 2.3E-03 | NA | 9.6E-05 | 2.4E-03 |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 2.7E-04 | NA | 1.2E-05 | 2.9E-04 |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 5.0E-03 | NA | 2.1E-04 | 5.3E-03 |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA | CNS | 2.3E-04 | NA | 2.5E-04 | 4.8E-04 |
| | | | Mercury | NA | NA | NA | NA | Immune system | 3.9E-03 | NA | 2.3E-03 | 6.2E-03 |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 2.4E-03 | NA | 3.8E-03 | 6.2E-03 |
| | | | Zinc | NA | NA | NA | NA | Blood | 8.6E-04 | NA | 3.6E-05 | 8.9E-04 |
| | | | Chemical Total | 2.2E-06 | 0.0E+00 | 2.7E-07 | 2.4E-06 | | 5.1E-02 | 0.0E+00 | 1.6E-02 | 6.8E-02 |
| | | | Exposure Point Total | | | | 2.4E-06 | | | | | 6.8E-02 |
| | | | Exposure Medium Total | | | | 2.4E-06 | | | | | 6.8E-02 |
| Air | Emissions from Soil | Chromium | NA | 2.6E-09 | NA | 2.6E-09 | Respiratory System | NA | 8.6E-06 | NA | 8.6E-06 | |
| | | | Chemical Total | 0.0E+00 | 2.6E-09 | 0.0E+00 | 2.6E-09 | | 0.0E+00 | 8.6E-06 | 0.0E+00 | 8.6E-06 |

TABLE 9.4.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Youth |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|--------|-----------------------|----------------------------------|-----------|------------|--------|-----------------------|---------|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| | | Exposure Point Total | | | | | | 2.6E-09 | | | | 8.6E-06 | | |
| | | Exposure Medium Total | | | | | | | 2.6E-09 | | | | 8.6E-06 | |
| Medium Total | | | | | | | | 2.4E-06 | | | | 6.8E-02 | | |
| Receptor Total | | | | | | | | 2.4E-06 | | | | Receptor HI Total | 6.8E-02 | |

HI = Hazard Index

NA = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

| | |
|---|---------|
| Total Fingernails HI Across All Media = | 3.3E-03 |
| Total Eyes HI Across All Media = | 3.3E-03 |
| Total Liver HI Across All Media = | 1.3E-04 |

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|------------|---------------------|----------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|---------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 1.9E-08 | NA | 7.0E-09 | 2.6E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 2.7E-07 | NA | 9.7E-08 | 3.6E-07 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 4.9E-08 | NA | 1.8E-08 | 6.7E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | 4.0E-09 | NA | 1.5E-09 | 5.5E-09 | NA | NA | NA | NA | NA |
| | | | Chrysene | 3.1E-10 | NA | 1.1E-10 | 4.2E-10 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 5.7E-08 | NA | 2.1E-08 | 7.8E-08 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 1.4E-08 | NA | 5.2E-09 | 1.9E-08 | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | 4.3E-08 | NA | 1.7E-08 | 6.0E-08 | Finger nails, Eyes | 1.3E-02 | NA | 4.9E-03 | 1.8E-02 |
| | | | Aroclor-1260 | 4.4E-08 | NA | 1.7E-08 | 6.1E-08 | NA | NA | NA | NA | NA |
| | | | Dieldrin | 3.7E-08 | NA | 1.0E-08 | 4.8E-08 | Liver | 5.4E-04 | NA | 1.5E-04 | 7.0E-04 |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 2.5E-02 | NA | 7.1E-04 | 2.6E-02 |
| | | | Antimony | NA | NA | NA | NA | Blood | 1.2E-02 | NA | 2.2E-03 | 1.4E-02 |
| | | | Arsenic | 5.4E-06 | NA | 4.5E-07 | 5.8E-06 | Skin, Vascular | 1.4E-01 | NA | 1.2E-02 | 1.5E-01 |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 1.2E-03 | NA | 4.6E-04 | 1.6E-03 |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 1.4E-02 | NA | 1.5E-03 | 1.5E-02 |
| | | | Chromium | 1.9E-06 | NA | 1.4E-09 | 1.9E-06 | NOE | 1.5E-02 | NA | 1.7E-02 | 3.2E-02 |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 1.4E-02 | NA | 3.8E-04 | 1.4E-02 |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 1.6E-03 | NA | 4.6E-05 | 1.7E-03 |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 3.0E-02 | NA | 8.5E-04 | 3.1E-02 |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA | CNS | 1.4E-03 | NA | 9.8E-04 | 2.4E-03 |
| | | | Mercury | NA | NA | NA | NA | Immune system | 2.3E-02 | NA | 9.4E-03 | 3.3E-02 |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 1.4E-02 | NA | 1.5E-02 | 3.0E-02 |
| | | | Zinc | NA | NA | NA | NA | Blood | 5.1E-03 | NA | 1.4E-04 | 5.3E-03 |
| | | | Chemical Total | 7.8E-06 | 0.0E+00 | 6.4E-07 | 8.5E-06 | | 3.1E-01 | 0.0E+00 | 6.6E-02 | 3.7E-01 |
| | | | Exposure Point Total | | | | 8.5E-06 | | | | | 3.7E-01 |
| | | | Exposure Medium Total | | | | 8.5E-06 | | | | | 3.7E-01 |
| Air | Emissions from Soil | Chromium | | NA | 1.5E-09 | NA | 1.5E-09 | Respiratory System | NA | 8.6E-06 | NA | 8.6E-06 |
| | | | Chemical Total | 0.0E+00 | 1.5E-09 | 0.0E+00 | 1.5E-09 | | 0.0E+00 | 8.6E-06 | 0.0E+00 | 8.6E-06 |

TABLE 9.5.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|---|
| Scenario Timeframe: Current/Future |
| Receptor Population: Trespasser/Visitor |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|--------|-----------------------|----------------------------------|-----------|------------|--------|-----------------------|---------|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| | | Exposure Point Total | | | | | | 1.5E-09 | | | | 8.6E-06 | | |
| | | Exposure Medium Total | | | | | | | 1.5E-09 | | | | 8.6E-06 | |
| Medium Total | | | | | | | | 8.5E-06 | | | | 3.7E-01 | | |
| Receptor Total | | | | | | | | 8.5E-06 | | | | Receptor HI Total | 3.7E-01 | |

HI = Hazard Index

NA = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

| | |
|---|---------|
| Total Fingernails HI Across All Media = | 1.8E-02 |
| Total Eyes HI Across All Media = | 1.8E-02 |
| Total Liver HI Across All Media = | 7.0E-04 |

TABLE 9.6.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Future |
| Receptor Population: Construction Worker |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|-------------------|---------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 7.9E-09 | NA | 1.4E-09 | 9.3E-09 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 1.1E-07 | NA | 2.0E-08 | 1.3E-07 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 2.0E-08 | NA | 3.6E-09 | 2.4E-08 | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | 1.7E-09 | NA | 3.0E-10 | 1.9E-09 | NA | NA | NA | NA | NA |
| | | | Chrysene | 1.3E-10 | NA | 2.3E-11 | 1.5E-10 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 2.4E-08 | NA | 4.2E-09 | 2.8E-08 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 5.9E-09 | NA | 1.0E-09 | 6.9E-09 | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | 1.8E-08 | NA | 3.4E-09 | 2.1E-08 | Finger nails, Eyes | 1.2E-02 | NA | 2.4E-03 | 1.5E-02 |
| | | | Aroclor-1260 | 1.8E-08 | NA | 3.5E-09 | 2.2E-08 | Liver | 1.3E-03 | NA | NA | NA |
| | | | Dieldrin | 1.5E-08 | NA | 2.1E-09 | 1.7E-08 | Neurotoxicity | 6.3E-02 | NA | 8.6E-04 | 6.3E-02 |
| | | | Aluminum | NA | NA | NA | NA | Blood | 2.9E-02 | NA | 2.6E-03 | 3.1E-02 |
| | | | Antimony | NA | NA | NA | NA | Skin, Vascular | 3.4E-01 | NA | 1.4E-02 | 3.6E-01 |
| | | | Arsenic | 2.2E-06 | NA | 9.1E-08 | 2.3E-06 | Nephropathy* | 8.1E-03 | NA | 1.6E-03 | 9.7E-03 |
| | | | Barium | NA | NA | NA | NA | Significant proteinuria* | 3.3E-02 | NA | 1.8E-03 | 3.5E-02 |
| | | | Cadmium | NA | NA | NA | NA | NOE | 5.6E-03 | NA | 3.1E-03 | 8.7E-03 |
| | | | Chromium | 8.0E-07 | NA | 2.8E-10 | 8.0E-07 | Iodine uptake | 3.4E-03 | NA | 4.7E-05 | 3.4E-03 |
| | | | Cobalt | NA | NA | NA | NA | Gastrointestinal | 4.1E-03 | NA | 5.6E-05 | 4.1E-03 |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 7.5E-02 | NA | 1.0E-03 | 7.6E-02 |
| | | | Iron | NA | NA | NA | NA | CNS | 3.5E-03 | NA | 1.2E-03 | 4.7E-03 |
| | | | Lead | NA | NA | NA | NA | Immune system | 5.8E-03 | NA | 1.1E-03 | 6.9E-03 |
| | | | Manganese | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Mercury | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Thallium | NA | NA | NA | NA | Hair Cystine | 2.5E-02 | NA | 1.3E-02 | 3.8E-02 |
| | | | Vanadium | NA | NA | NA | NA | Blood | 1.3E-02 | NA | 1.7E-04 | 1.3E-02 |
| | | | Zinc | NA | NA | NA | NA | | | | | |
| | | | Chemical Total | 3.2E-06 | 0.0E+00 | 1.3E-07 | 3.4E-06 | | 6.2E-01 | 0.0E+00 | 4.4E-02 | 6.7E-01 |
| | | | Exposure Point Total | | | | 3.4E-06 | | | | | 6.7E-01 |
| | | | Exposure Medium Total | | | | 3.4E-06 | | | | | 6.7E-01 |
| | Air | Emissions from Soil | Chromium | NA | 5.0E-09 | NA | 5.0E-09 | Respiratory System | NA | 4.1E-05 | NA | 4.1E-05 |
| | | | Chemical Total | 0.0E+00 | 5.0E-09 | 0.0E+00 | 5.0E-09 | | 0.0E+00 | 4.1E-05 | 0.0E+00 | 4.1E-05 |
| | | Exposure Point Total | | | | | 5.0E-09 | | | | | 4.1E-05 |
| | | Exposure Medium Total | | | | | 5.0E-09 | | | | | 4.1E-05 |
| Medium Total | | | | | | | 3.4E-06 | | | | | 6.7E-01 |
| Receptor Total | | | | | | | 3.4E-06 | | | Receptor HI Total | | 6.7E-01 |

HI = Hazard Index

NA = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

Total Fingernails HI Across All Media =

1.5E-02

Total Eyes HI Across All Media =

1.5E-02

Total Liver HI Across All Media =

1.5E-03

TABLE 9.7.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Receptor Population: Resident |
| Receptor Age: Adult |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|-------------------|---------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Chrysene | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | NA | NA | NA | NA | Finger nails, Eyes | 9.1E-03 | NA | 5.1E-03 | 1.4E-02 |
| | | | Aroclor-1260 | NA | NA | NA | NA | | NA | NA | NA | NA |
| | | | Dieldrin | NA | NA | NA | NA | Liver | 3.9E-04 | NA | 1.6E-04 | 5.5E-04 |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 1.8E-02 | NA | 7.3E-04 | 1.9E-02 |
| | | | Antimony | NA | NA | NA | NA | Blood | 8.3E-03 | NA | 2.2E-03 | 1.1E-02 |
| | | | Arsenic | NA | NA | NA | NA | Skin, Vascular | 1.0E-01 | NA | 1.2E-02 | 1.1E-01 |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 8.3E-04 | NA | 4.7E-04 | 1.3E-03 |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 9.7E-03 | NA | 1.6E-03 | 1.1E-02 |
| | | | Chromium | NA | NA | NA | NA | | NOE | 1.1E-02 | NA | 1.7E-02 |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 9.9E-03 | NA | 3.9E-04 | 1.0E-02 |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 1.2E-03 | NA | 4.7E-05 | 1.2E-03 |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 2.2E-02 | NA | 8.7E-04 | 2.3E-02 |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA | CNS | 1.0E-03 | NA | 1.0E-03 | 2.0E-03 |
| | | | Mercury | NA | NA | NA | NA | Immune system | 1.7E-02 | NA | 9.6E-03 | 2.7E-02 |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 1.0E-02 | NA | 1.6E-02 | 2.6E-02 |
| | | | Zinc | NA | NA | NA | NA | Blood | 3.7E-03 | NA | 1.5E-04 | 3.9E-03 |
| | | | Chemical Total | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | | 2.2E-01 | 0.0E+00 | 6.7E-02 | 2.9E-01 |
| | | | Exposure Point Total | | | | 0.0E+00 | | | | | 2.9E-01 |
| | | | Exposure Medium Total | | | | 0.0E+00 | | | | | 2.9E-01 |
| | Air | Emissions from Soil | Chromium | NA | NA | NA | 0.0E+00 | Respiratory System | NA | 1.2E-04 | NA | 1.2E-04 |
| | | | Chemical Total | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | | 0.0E+00 | 1.2E-04 | 0.0E+00 | 1.2E-04 |
| | | Exposure Point Total | | | | 0.0E+00 | | | | | | 1.2E-04 |
| | | Exposure Medium Total | | | | 0.0E+00 | | | | | | 1.2E-04 |
| Medium Total | | | | | | 0.0E+00 | | | | | | 2.9E-01 |
| Receptor Total | | | | | | 0.0E+00 | | | | Receptor HI Total | | 2.9E-01 |

HI = Hazard Index

N/A = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

| | |
|---|---------|
| Total Fingernails HI Across All Media = | 1.4E-02 |
| Total Eyes HI Across All Media = | 1.4E-02 |
| Total Liver HI Across All Media = | 5.5E-04 |

TABLE 9.8.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 16, MCAS Cherry Point

Scenario Timeframe: Current/Future

Receptor Population: Residential

Receptor Age: Child

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | |
|----------------|---------------------|-----------------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|-------------------|---------|-----------------------|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Benzo(a)pyrene | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Benzo(b)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Benzo(k)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Chrysene | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Dibenz(a,h)anthracene | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Indeno(1,2,3-cd)pyrene | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Aroclor-1254 | NA | NA | NA | NA | Finger nails, Eyes | 8.9E-02 | NA | 3.5E-02 | 1.2E-01 | |
| | | | Aroclor-1260 | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Dieldrin | NA | NA | NA | NA | Liver | 3.8E-03 | NA | 1.1E-03 | 4.9E-03 | |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 1.8E-01 | NA | 5.0E-03 | 1.8E-01 | |
| | | | Antimony | NA | NA | NA | NA | Blood | 8.1E-02 | NA | 1.5E-02 | 9.6E-02 | |
| | | | Arsenic | NA | NA | NA | NA | Skin, Vascular | 9.7E-01 | NA | 8.2E-02 | 1.1E+00 | |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 8.1E-03 | NA | 3.2E-03 | 1.1E-02 | |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 9.5E-02 | NA | 1.1E-02 | 1.1E-01 | |
| | | | Chromium | NA | NA | NA | NA | NOE | 1.1E-01 | NA | 1.2E-01 | 2.3E-01 | |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 9.6E-02 | NA | 2.7E-03 | 9.9E-02 | |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 1.2E-02 | NA | 3.2E-04 | 1.2E-02 | |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 2.1E-01 | NA | 6.0E-03 | 2.2E-01 | |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Manganese | NA | NA | NA | NA | CNS | 9.8E-03 | NA | 6.9E-03 | 1.7E-02 | |
| | | | Mercury | NA | NA | NA | NA | Immune system | 1.6E-01 | NA | 6.6E-02 | 2.3E-01 | |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA | |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 1.0E-01 | NA | 1.1E-01 | 2.1E-01 | |
| | | | Zinc | NA | NA | NA | NA | Blood | 3.6E-02 | NA | 1.0E-03 | 3.7E-02 | |
| | | | Chemical Total | 0.0E+00 | NA | 0.0E+00 | 0.0E+00 | | 2.2E+00 | NA | 4.6E-01 | 2.6E+00 | |
| | | | Exposure Point Total | | | | 0.0E+00 | | | | | 2.6E+00 | |
| | | | Exposure Medium Total | | | | 0.0E+00 | | | | | 2.6E+00 | |
| Air | Emissions from Soil | Chromium | | NA | NA | NA | 0.0E+00 | Respiratory System | NA | 1.8E-04 | NA | 1.8E-04 | |
| | | | Chemical Total | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | | 0.0E+00 | 1.8E-04 | 0.0E+00 | 1.8E-04 | |
| | | Exposure Point Total | | | | | 0.0E+00 | | | | | 1.8E-04 | |
| | | Exposure Medium Total | | | | | 0.0E+00 | | | | | 1.8E-04 | |
| Medium Total | | | | | | | 0.0E+00 | | | | | 2.6E+00 | |
| Receptor Total | | | | | | | 0.0E+00 | | | Receptor HI Total | | 2.6E+00 | |

HI = Hazard Index

N/A = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

Total Fingernails HI Across All Media =

1.2E-01

Total Eyes HI Across All Media =

1.2E-01

Total Liver HI Across All Media =

4.9E-03

TABLE 9.9.RME

SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs

REASONABLE MAXIMUM EXPOSURE

Site 16, MCAS Cherry Point

Scenario Timeframe: Current/Future
 Receptor Population: Resident
 Receptor Age: Adult/Child

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|----------------|-----------------|-----------------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|-------------------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 7.9E-07 | NA | 2.0E-06 | 2.8E-06 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 1.1E-05 | NA | 2.8E-05 | 3.9E-05 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 2.0E-06 | NA | 5.1E-06 | 7.1E-06 | NA | NA | NA | NA | NA |
| | | | Benzo(k)fluoranthene | 1.7E-07 | NA | 4.2E-07 | 5.8E-07 | NA | NA | NA | NA | NA |
| | | | Chrysene | 1.3E-08 | NA | 3.2E-08 | 4.5E-08 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 2.4E-06 | NA | 6.0E-06 | 8.4E-06 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 5.8E-07 | NA | 1.5E-06 | 2.1E-06 | NA | NA | NA | NA | NA |
| | | | Aroclor-1254 | 4.2E-07 | NA | 1.8E-07 | 6.0E-07 | NA | NA | NA | NA | NA |
| | | | Aroclor-1260 | 4.2E-07 | NA | 1.9E-07 | 6.1E-07 | NA | NA | NA | NA | NA |
| | | | Dieldrin | 3.6E-07 | NA | 1.1E-07 | 4.7E-07 | NA | NA | NA | NA | NA |
| | | | Aluminum | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Antimony | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Arsenic | 5.1E-05 | NA | 4.9E-06 | 5.6E-05 | NA | NA | NA | NA | NA |
| | | | Barium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Cadmium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Chromium | 4.1E-05 | NA | 3.9E-07 | 4.1E-05 | NA | NA | NA | NA | NA |
| | | | Cobalt | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Copper | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Iron | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Manganese | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Mercury | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Vanadium | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Zinc | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| | | | Chemical Total | 1.1E-04 | 0.0E+00 | 4.9E-05 | 1.6E-04 | | 0.0E+00 | NA | 0.0E+00 | 0.0E+00 |
| | | | Exposure Point Total | | | | 1.6E-04 | | | | | 0.0E+00 |
| | | | Exposure Medium Total | | | | 1.6E-04 | | | | | 0.0E+00 |
| | Air | Emissions from Soil | Chromium | NA | 2.7E-08 | NA | 2.7E-08 | Respiratory System | NA | NA | NA | 0.0E+00 |
| | | | Chemical Total | 0.0E+00 | 2.7E-08 | 0.0E+00 | 2.7E-08 | | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 |
| | | Exposure Point Total | | | | | 2.7E-08 | | | | | 0.0E+00 |
| | | Exposure Medium Total | | | | | 2.7E-08 | | | | | 0.0E+00 |
| Medium Total | | | | | | | 1.6E-04 | | | | | 0.0E+00 |
| Receptor Total | | | | | | | 1.6E-04 | | | | Receptor HI Total | 0.0E+00 |

HI = Hazard Index

NA = Not available/not applicable

TABLE 9.1.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Site 16, MCAS Cherry Point

| |
|--|
| Scenario Timeframe: Future |
| Receptor Population: Hypothetical Resident |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | | |
|----------------|-----------------|----------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|-------------------|---------|-----------------------|--|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | | |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Benzo(a)pyrene | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Benzo(b)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Benzo(k)fluoranthene | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Chrysene | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Dibenz(a,h)anthracene | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Indeno(1,2,3-cd)pyrene | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Aroclor-1254 | NA | NA | NA | NA | Finger nails, Eyes | 2.5E-02 | NA | 3.9E-03 | 2.9E-02 | | |
| | | | Aroclor-1260 | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Dieldrin | NA | NA | NA | NA | Liver | 6.2E-04 | NA | 6.9E-05 | 6.9E-04 | | |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 3.4E-02 | NA | 3.8E-04 | 3.4E-02 | | |
| | | | Antimony | NA | NA | NA | NA | Blood | 1.8E-02 | NA | 1.3E-03 | 1.9E-02 | | |
| | | | Arsenic | NA | NA | NA | NA | Skin, Vascular | 9.8E-02 | NA | 3.3E-03 | 1.0E-01 | | |
| | | | Barium | NA | NA | NA | NA | Nephropathy* | 1.9E-03 | NA | 3.0E-04 | 2.2E-03 | | |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 8.2E-03 | NA | 3.7E-04 | 8.5E-03 | | |
| | | | Chromium | NA | NA | NA | NA | NOE | 2.7E-02 | 1.2E-04 | 1.2E-02 | 3.9E-02 | | |
| | | | Cobalt | NA | NA | NA | NA | Iodine uptake | 2.5E-02 | NA | 2.8E-04 | 2.5E-02 | | |
| | | | Copper | NA | NA | NA | NA | Gastrointestinal | 2.6E-03 | NA | 2.9E-05 | 2.6E-03 | | |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 5.4E-02 | NA | 6.1E-04 | 5.5E-02 | | |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Manganese | NA | NA | NA | NA | CNS | 2.4E-03 | NA | 6.6E-04 | 3.0E-03 | | |
| | | | Mercury | NA | NA | NA | NA | Immune system | 1.1E-02 | NA | 1.7E-03 | 1.2E-02 | | |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA | | |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 1.9E-02 | NA | 8.0E-03 | 2.7E-02 | | |
| | | | Zinc | NA | NA | NA | NA | Blood | 7.3E-03 | NA | 8.1E-05 | 7.3E-03 | | |
| | | | Chemical Total | 0.0E+00 | NA | 0.0E+00 | 0.0E+00 | | 3.3E-01 | 1.2E-04 | 3.3E-02 | 3.7E-01 | | |
| | | | Exposure Point Total | | | | 0.0E+00 | | | | | 3.7E-01 | | |
| | | | Exposure Medium Total | | | | 0.0E+00 | | | | | 3.7E-01 | | |
| Medium Total | | | | | | | 0.0E+00 | | | | | 3.7E-01 | | |
| Receptor Total | | | | | | | 0.0E+00 | | | Receptor HI Total | | 3.7E-01 | | |

Soil* = Surface soil and subsurface soil combined.

HI = Hazard Index

NA = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

Total Fingernails HI Across All Media = 2.9E-02

Total Eyes HI Across All Media = 2.9E-02

Total Liver HI Across All Media = 6.9E-04

TABLE 9.2.CTE
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY EXPOSURE
Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | | | |
|----------------|---------------------|-----------------------|-------------------------------|-----------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|-------------------|-----------------------|--|--|--|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | | | |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 4.7E-07 | NA | 1.3E-06 | 1.8E-06 | NA | NA | NA | NA | NA | | | |
| | | | Benzo(a)pyrene | 3.7E-06 | NA | 1.9E-05 | 2.2E-05 | NA | NA | NA | NA | NA | | | |
| | | | Benzo(b)fluoranthene | 1.2E-06 | NA | 3.4E-06 | 4.6E-06 | NA | NA | NA | NA | NA | | | |
| | | | Benzo(k)fluoranthene | 9.9E-08 | NA | 2.8E-07 | 3.8E-07 | NA | NA | NA | NA | NA | | | |
| | | | Chrysene | 8.6E-11 | NA | 4.7E-11 | 1.3E-10 | NA | NA | NA | NA | NA | | | |
| | | | Dibenz(a,h)anthracene | 1.4E-06 | NA | 4.0E-06 | 5.4E-06 | NA | NA | NA | NA | NA | | | |
| | | | Indeno(1,2,3-cd)pyrene | 3.5E-07 | NA | 9.9E-07 | 1.3E-06 | NA | NA | NA | NA | NA | | | |
| | | | Aroclor-1254 | 1.1E-07 | NA | 1.8E-08 | 1.3E-07 | NA | NA | NA | NA | NA | | | |
| | | | Aroclor-1260 | 1.1E-07 | NA | 1.8E-08 | 1.3E-07 | NA | NA | NA | NA | NA | | | |
| | | | Dieldrin | 9.6E-08 | NA | 1.1E-08 | 1.1E-07 | NA | NA | NA | NA | NA | | | |
| | | | Aluminum | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Antimony | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Arsenic | 1.4E-05 | NA | 4.7E-07 | 1.4E-05 | NA | NA | NA | NA | NA | | | |
| | | | Barium | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Cadmium | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Chromium | 4.8E-05 | NA | 2.6E-07 | 4.8E-05 | NA | NA | NA | NA | NA | | | |
| | | | Cobalt | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Copper | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Iron | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Lead | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Manganese | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Mercury | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Thallium | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Vanadium | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | Zinc | NA | NA | NA | NA | NA | NA | NA | NA | NA | | | |
| | | | | Chemical Total | 6.9E-05 | 0.0E+00 | 2.9E-05 | 9.9E-05 | | 0.0E+00 | NA | 0.0E+00 | | | |
| | | | | Exposure Point Total | | | | 9.9E-05 | | | | 0.0E+00 | | | |
| | | | | Exposure Medium Total | | | | 9.9E-05 | | | | 0.0E+00 | | | |
| Air | Emissions from Soil | Chromium | | NA | 2.7E-08 | NA | 2.7E-08 | Spiratory Syst | NA | NA | NA | 0.0E+00 | | | |
| | | | Chemical Total | 0.0E+00 | 2.7E-08 | 0.0E+00 | 2.7E-08 | | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | | | |
| | | Exposure Point Total | | | | | 2.7E-08 | | | | | 0.0E+00 | | | |
| | | Exposure Medium Total | | | | | 2.7E-08 | | | | | 0.0E+00 | | | |
| Medium Total | | | | | | | 9.9E-05 | | | | | 0.0E+00 | | | |
| Receptor Total | | | | | | | 9.9E-05 | | | | Receptor HI Total | 0.0E+00 | | | |

HI = Hazard Index

NA = Not available/not applicable

TABLE 10.1.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Receptor Population: Residential |
| Receptor Age: Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | | |
|----------------|-----------------|----------------|-------------------------------|---------------------|------------|----------------------|-----------------------|----------------------------------|-----------|--------------------|-------------------|-----------------------|---------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total | |
| Total Soil | Total Soil | Total Soil | Aroclor-1254 | NA | NA | NA | NA | Finger nails, Eyes | 8.9E-02 | NA | 3.5E-02 | 1.2E-01 | |
| | | | Aluminum | NA | NA | NA | NA | Neurotoxicity | 1.8E-01 | NA | 5.0E-03 | 1.8E-01 | |
| | | | Arsenic | NA | NA | NA | NA | Skin, Vascular | 9.7E-01 | NA | 8.2E-02 | 1.1E+00 | |
| | | | Cadmium | NA | NA | NA | NA | Significant proteinuria* | 9.5E-02 | NA | 1.1E-02 | 1.1E-01 | |
| | | | Chromium | NA | NA | NA | NA | NOE | 1.1E-01 | NA | 1.2E-01 | 2.3E-01 | |
| | | | Iron | NA | NA | NA | NA | Gastrointestinal | 2.1E-01 | NA | 6.0E-03 | 2.2E-01 | |
| | | | Mercury | NA | NA | NA | NA | Immune system | 1.6E-01 | NA | 6.6E-02 | 2.3E-01 | |
| | | | Vanadium | NA | NA | NA | NA | Hair Cystine | 1.0E-01 | NA | 1.1E-01 | 2.1E-01 | |
| | | | Chemical Total | 0.0E+00 | NA | 0.0E+00 | 0.0E+00 | | 1.9E+00 | NA | 4.3E-01 | 2.3E+00 | |
| | | | Exposure Point Total | | | | 0.0E+00 | | | | | 2.3E+00 | |
| | | | Exposure Medium Total | | | | 0.0E+00 | | | | | 2.3E+00 | |
| | | | Air | Emissions from Soil | Chromium | NA | NA | NA | 0.0E+00 | Respiratory System | NA | 1.8E-04 | NA |
| | | | | | | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | | 0.0E+00 | 1.8E-04 | 1.8E-04 |
| | | | | | | Chemical Total | 0.0E+00 | 0.0E+00 | 0.0E+00 | | 0.0E+00 | 1.8E-04 | 1.8E-04 |
| | | | | | | Exposure Point Total | | | 0.0E+00 | | | | 1.8E-04 |
| | | | Exposure Medium Total | | | | 0.0E+00 | | | | | 1.8E-04 | |
| | | | Medium Total | | | | 0.0E+00 | | | | | 2.3E+00 | |
| Receptor Total | | | | | | | 0.0E+00 | | | | Receptor HI Total | 2.3E+00 | |

HI = Hazard Index

N/A = Not available/not applicable

* Nephropathy and significant proteinuria are adverse effects that affect the kidneys so the HQ for these are included with the total kidney HIs

| | |
|---|---------|
| Total Fingernails HI Across All Media = | 1.2E-01 |
| Total Eyes HI Across All Media = | 1.2E-01 |
| | |
| Total CNS/Neurotoxicity HI Across All Media = | 1.8E-01 |
| Total Skin HI Across All Media = | 1.1E+00 |
| Total Kidney HI Across All Media = | 1.1E-01 |
| Total Gastrointestinal HI Across All Media = | 2.2E-01 |
| Total Immune System HI Across All Media = | 2.3E-01 |
| Total Hair Cystine HI Across All Media = | 2.1E-01 |

TABLE 10.2 RME
 SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
 REASONABLE MAXIMUM EXPOSURE
 Site 16, MCAS Cherry Point

| |
|------------------------------------|
| Scenario Timeframe: Current/Future |
| Receptor Population: Resident |
| Receptor Age: Adult/Child |

| Medium | Exposure Medium | Exposure Point | Chemical of Potential Concern | Carcinogenic Risk | | | | Non-Carcinogenic Hazard Quotient | | | | |
|----------------|-----------------|----------------|-------------------------------|-------------------|------------|---------|-----------------------|----------------------------------|-----------|------------|-------------------|-----------------------|
| | | | | Ingestion | Inhalation | Dermal | Exposure Routes Total | Primary Target Organ(s) | Ingestion | Inhalation | Dermal | Exposure Routes Total |
| Total Soil | Total Soil | Total Soil | Benzo(a)anthracene | 7.9E-07 | NA | 2.0E-06 | 2.8E-06 | NA | NA | NA | NA | NA |
| | | | Benzo(a)pyrene | 1.1E-05 | NA | 2.8E-05 | 3.9E-05 | NA | NA | NA | NA | NA |
| | | | Benzo(b)fluoranthene | 2.0E-06 | NA | 5.1E-06 | 7.1E-06 | NA | NA | NA | NA | NA |
| | | | Dibenz(a,h)anthracene | 2.4E-06 | NA | 6.0E-06 | 8.4E-06 | NA | NA | NA | NA | NA |
| | | | Indeno(1,2,3-cd)pyrene | 5.8E-07 | NA | 1.5E-06 | 2.1E-06 | NA | NA | NA | NA | NA |
| | | | Arsenic | 5.1E-05 | NA | 4.9E-06 | 5.6E-05 | NA | NA | NA | NA | NA |
| | | | Chromium | 4.1E-05 | NA | 3.9E-07 | 4.1E-05 | NA | NA | NA | NA | NA |
| | | | Chemical Total | 1.1E-04 | 0.0E+00 | 4.8E-05 | 1.6E-04 | | 0.0E+00 | NA | 0.0E+00 | 0.0E+00 |
| | | | Exposure Point Total | | | | 1.6E-04 | | | | | 0.0E+00 |
| | | | Exposure Medium Total | | | | 1.6E-04 | | | | | 0.0E+00 |
| | | | Medium Total | | | | 1.6E-04 | | | | | 0.0E+00 |
| Receptor Total | | | | | | | 1.6E-04 | | | | Receptor HI Total | 0.0E+00 |

HI = Hazard Index

NA = Not available/not applicable

Attachment 2
Analytical Data

Attachment 2
MCAS Cherry Point OU1 - Site 16
New Analytical Data used in the Revised HHRA

Attachment 2
MCAS Cherry Point OU1 - Site 16
Raw Analytical Data used in the Revised HHRA

| Station ID | OU1-16SB02 | OU16-CS-1 | OU16-CS-10 | OU16-CS-14 | OU16-CS-15 | OU16-CS-16 | OU16-CS-17 | OU16-CS-18 | OU16-CS-19 | OU16-CS-2 | OU16-CS-26 | OU16-CS-27 | OU16-CS-28 | OU16-CS-3 | OU16-CS-7 | OU16-CS-8 | OU16-CS-9 | OU1-SITE16-SO-01 | OU1-SITE16-SO-02 | OU1-SITE16-SO-03 |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------|------------------|------------------|
| Sample ID | 16SB02-0001 | CP63-CS-001 | CP63-CS-010 | CP63-CS-014 | CP63-CS-015 | CP63-CS-016 | CP63-CS-017 | CP63-CS-018 | CP63-CS-019 | CP63-CS-002 | CP63-CS-026 | CP63-CS-027 | CP63-CS-028 | CP63-CS-003 | CP63-CS-007 | CP63-CS-008 | CP63-CS-009 | SO01-0001 | SO02-0001 | SO03-0001 |
| Sample Date | 09/21/00 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 08/01/95 | 08/01/95 | 08/01/95 |
| Chemical Name | | | | | | | | | | | | | | | | | | | | |
| 4-Chloroaniline | 370 U | NA | 480 U | 460 U | 420 U |
| 4-Chlorophenyl-phenylether | 370 U | NA | 480 U | 460 U | 420 U |
| 4-Methylphenol | 370 U | NA | 480 U | 460 U | 420 U |
| 4-Nitroaniline | 930 U | NA | 1,200 U | 1,100 U | 1,000 U |
| 4-Nitrophenol | 930 U | NA | 1,200 U | 1,100 U | 1,000 U |
| Acenaphthene | 370 U | NA | 480 U | 460 U | 420 U |
| Acenaphthylene | 370 U | NA | 480 U | 460 U | 420 U |
| Acetophenone | 370 U | NA | NA | NA |
| Anthracene | 370 U | NA | 480 U | 460 U | 24 J |
| Atrazine | 370 U | NA | NA | NA |
| Benzaldehyde | 370 U | NA | NA | NA |
| Benzo(a)anthracene | 96 J | NA | 74 J | 79 J | 150 J |
| Benzo(a)pyrene | 94 J | NA | 100 J | 100 J | 160 J |
| Benzo(b)fluoranthene | 150 J | NA | 130 J | 120 J | 170 J |
| Benzo(g,h,i)perylene | 80 J | NA | 100 J | 80 J | 140 J |
| Benzo(k)fluoranthene | 120 J | NA | 100 J | 74 J | 140 J |
| bis(2-Chloroethoxy)methane | 370 U | NA | 480 U | 460 U | 420 U |
| bis(2-Chloroethyl)ether | 370 U | NA | 480 U | 460 U | 420 U |
| bis(2-Ethylhexyl)phthalate | 370 U | NA | 120 J | 220 J | 54 J |
| Butylbenzylphthalate | 370 U | NA | 480 U | 460 U | 420 U |
| Caprolactam | 370 U | NA | NA | NA |
| Carbazole | 370 U | NA | 480 U | 460 U | 420 U |
| Chrysene | 140 J | NA | 100 J | 90 J | 160 J |
| Dibenz(a,h)anthracene | 370 U | NA | 34 J | 41 J | 46 J |
| Dibenzofuran | 370 U | NA | 480 U | 460 U | 420 U |
| Diethylphthalate | 370 U | NA | 480 U | 460 U | 420 U |
| Dimethyl phthalate | 370 U | NA | 480 U | 460 U | 420 U |
| Di-n-butylphthalate | 370 U | NA | 480 U | 460 U | 34 J |
| Di-n-octylphthalate | 370 U | NA | 480 U | 460 U | 420 U |
| Fluoranthene | 110 J | NA | 97 J | 120 J | 210 J |
| Fluorene | 370 U | NA | 480 U | 460 U | 420 U |
| Hexachlorobenzene | 370 U | NA | 480 U | 460 U | 420 U |
| Hexachlorobutadiene | 370 U | NA | 480 U | 460 U | 420 U |
| Hexachlorocyclopentadiene | 370 U | NA | 480 U | 460 U | 420 U |
| Hexachloroethane | 370 U | NA | 480 U | 460 U | 420 U |
| Indeno(1,2,3-cd)pyrene | 88 J | NA | 92 J | 66 J | 140 J |
| Isophorone | 370 U | NA | 480 U | 460 U | 420 U |
| Naphthalene | 370 U | NA | 28 J | 46 U | 33 J |
| n-Nitroso-di-n-propylamine | 370 U | NA | 480 U | 460 U | 420 U |
| n-Nitrosodiphenylamine | 370 U | NA | 480 U | 460 U | 420 U |
| Nitrobenzene | 370 U | NA | 480 U | 460 U | 420 U |
| Pentachlorophenol | 930 U | NA | 1,200 U | 1,100 U | 1,000 U |
| Phenanthrene | 370 U | NA | 67 J | 61 J | 110 J |
| Phenol | 370 U | NA | 480 U | 460 U | 420 U |
| Pyrene | 190 J | NA | 90 J | 100 J | 160 J |
| Pesticide/Polychlorinated Biphenyls (UG/KG) | | | | | | | | | | | | | | | | | | | | |
| 4,4'-DDD | 3.7 U | NA | 4.9 | 4.6 U | 4.2 U |
| 4,4'-DDE | 3.7 U | NA | 7.1 | 4.6 U | 4.2 U |
| 4,4'-DDT | 3.7 U | NA | 26 | 11 | 7 |
| Aldrin | 1.9 U | | | | | | | | | | | | | | | | | | | |

Attachment 2
MCAS Cherry Point OU1 - Site 16
Raw Analytical Data used in the Revised HHRA

| Station ID | OU1-16SB02 | OU16-CS-1 | OU16-CS-10 | OU16-CS-14 | OU16-CS-15 | OU16-CS-16 | OU16-CS-17 | OU16-CS-18 | OU16-CS-19 | OU16-CS-2 | OU16-CS-26 | OU16-CS-27 | OU16-CS-28 | OU16-CS-3 | OU16-CS-7 | OU16-CS-8 | OU16-CS-9 | OU1-SITE16-SO-01 | OU1-SITE16-SO-02 | OU1-SITE16-SO-03 | |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------|------------------|------------------|--|
| Sample ID | 16SB02-0001 | CP63-CS-001 | CP63-CS-010 | CP63-CS-014 | CP63-CS-015 | CP63-CS-016 | CP63-CS-017 | CP63-CS-018 | CP63-CS-019 | CP63-CS-002 | CP63-CS-026 | CP63-CS-027 | CP63-CS-028 | CP63-CS-003 | CP63-CS-007 | CP63-CS-008 | CP63-CS-009 | SO01-0001 | SO02-0001 | SO03-0001 | |
| Sample Date | 09/21/00 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 09/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | |
| Chemical Name | | | | | | | | | | | | | | | | | | | | | |
| Heptachlor epoxide | 1.9 U | NA | 2.5 U | 2.4 U | 2.2 U | |
| Methoxychlor | 19 U | NA | 25 U | 24 U | 22 U | |
| Toxaphene | 190 U | NA | 250 U | 240 U | 220 U | |
| Total Metals (MG/KG) | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 5.050 | NA | 6,080 | 2,730 | 2,870 | |
| Antimony | 0.47 UJ | NA | 1.1 U | 1.1 U | 2.8 | |
| Arsenic | 2.9 | NA | 7.4 | 1.7 U | 2.3 | |
| Barium | 30.1 | NA | 53.3 | 8.3 | 169 | |
| Beryllium | 0.18 U | NA | 0.41 | 0.28 U | 0.24 U | |
| Boron | NA | 9.1 | 2.8 | 1.2 | |
| Cadmium | 0.76 U | NA | 3.8 | 0.54 | 0.3 | |
| Calcium | 4,460 J | NA | 10,400 | 1,370 | 1,790 | |
| Chromium | 6.8 | NA | 20.7 | 8.9 | 13.7 | |
| Cobalt | 0.87 U | NA | 2.7 | 0.67 | 2.6 | |
| Copper | 7.9 | NA | 31.1 | 4 | 46.2 | |
| Cyanide | 0.16 U | NA | 0.72 U | 0.7 U | 0.61 U | |
| Iron | 3,190 | NA | 8,290 | 2,310 | 18,400 | |
| Lead | 14.3 J | 18.2 | 2.8 J | 17.6 | 16.9 | 4.9 | 4.5 | 71.3 | 51.7 | 56.7 | 35.6 | 56 | 64.5 | 39.4 | 112 | 139 | 91.1 | 145 | 106 | 341 | |
| Magnesium | 275 | NA | 1,770 | 572 | 553 | |
| Manganese | 11.4 | NA | 174 | 22.8 | 239 | |
| Mercury | 0.05 | NA | 0.29 | 0.15 | 0.14 | |
| Molybdenum | NA | NA | NA | |
| Nickel | 2.1 U | NA | 8.2 | 2 | 16.4 | |
| Potassium | 184 U | NA | 483 | 215 | 197 | |
| Selenium | 0.67 U | NA | 1.4 U | 1.4 U | 1.2 U | |
| Silver | 0.67 U | NA | 0.36 | 0.28 U | 1.6 | |
| Sodium | 80.9 | NA | 924 | 651 | 351 | |
| Thallium | 1.5 U | NA | 1.7 U | 1.7 U | 1.5 U | |
| Vanadium | 10.7 | NA | 23 | 8.4 | 9.2 | |
| Zinc | 23.1 | NA | 1,810 | 114 | 181 | |
| Wet Chemistry | | | | | | | | | | | | | | | | | | | | | |
| % Solids (pct) | NA | NA | NA | |
| Cation Exchange Capacity (MEQ/100G) (meq/100g) | NA | NA | NA | |
| Cation Exchange Capacity (MEQ/100G) (mg/kg) | 4,980 J | NA | NA | NA | |
| Oil & Grease - HEM (mg/kg) | NA | 250 U | 876 | 250 U | 251 | 250 U | 250 U | 363 | 676 | 1,260 | 306 | 304 | 2,160 | 1,250 | 250 U | 250 U | 250 U | NA | NA | NA | |
| Oil & Grease - HEM (ug/kg) | NA | 205 | 77.8 | 329 | |
| pH (ph) | 7.6 | NA | NA | NA | |
| Total organic carbon (TOC) (mg/kg) | 3,720 | NA | NA | NA | |
| Total Petroleum Hydrocarbons (UG/KG) | | | | | | | | | | | | | | | | | | | | | |
| Fuel oil #6 | NA | 1.5 U | 1.4 U | 1.3 U | |
| JP-4 | NA | 1.5 U | 1.4 U | 1.3 U | |
| Kerosene | NA | 1.5 U | 1.4 U | 1.3 U | |
| Naphtha | NA | 1.5 U | 1.4 U | 1.3 U | |
| TPH-diesel range | NA | 1,300 J | 876,000 | 120,000 B | 820 B | 2,100 B | 1,100 B | 1,700 B | 6,100 B | 4,600 J | 4,100 U | 4,300 U | 39,000 | 1,400 J | 2,500 J | 9,100 | 1,500 J | 1.5 U | 1.4 U | 1.3 U | |
| TPH-gas range | NA | 2,100 U | 2,500 U | 2,400 U | 2,300 U | 2,400 U | 2,300 U | 2,100 U | 2,000 U | 2,400 | 2,500 U | 2,600 U | 2,400 U | 2,400 U | 2,200 U | 2,000 U | 2,400 U | 14.7 U | 10.2 J | 12.7 U | |

C:\Documents and Settings\WWaldron\My Documents\Mail\OL Temp Attachments\chpt_ou1_site16_raw_0411_teh.xls, Victoria Brynildsen, 04/28/2007

Notes:

Shading indicates detections

NA - Not analyzed

B - Analy

B - Analyte not detected above the level reported in

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

R - Unreliable Results

U - The material was analyzed for, but not detected

UJ - Analyte not detected, quantitation limit may be inaccurate

MEQ/100G - Milliequivalents per 100

MG/KG - Milligrams

PCT - Percent

pH - pH units

IIG/KG - Micrograms per kilogram

UG/RG - Micrograms p

Attachment 2
MCAS Cherry Point OU1 - Site 16
Raw Analytical Data used in the Revised HHRA

| Station ID | OU1-SITE16-SO-04 | | OU1-SITE16-SO-05 | | OU1-SITE16-SO-06 | | OU1-SITE16-SO-07 | | OU1-SITE16-SO-08 | | OU1-SITE16-SO-09 | | OU1-SITE16-SO-10 | | OU1-SITE16-SO-17 | | OU1-SITE16-SO-18 | | OU1-SITE16-SO-19 | | OU1-SS1 | OU1-SS1 | |
|---|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|--------------|------------------|----------|----------|---------|--|
| Sample ID | SB04-0102 | SO04-0001 | SO05-0001 | SO06-0001 | SO07-0001 | SO08-0001 | SO09-0001 | SO10-0001 | SB17-0102 | SO17-0001 | SB18-0102 | SO18-0001 | SB19-0102 | SO19-0001 | SB19-0102 | SO19-0001 | OU1-SS1-0001 | OU1-SS1-0001 | 08/01/95 | 08/01/95 | 10/30/94 | 05/19/0 | |
| Sample Date | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | | |
| Chemical Name | | | | | | | | | | | | | | | | | | | | | | | |
| Volatile Organic Compounds (UG/KG) | | | | | | | | | | | | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,1,2,2-Tetrachloroethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113) | NA | NA | NA | NA | NA | NA | |
| 1,1,2-Trichloroethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,1-Dichloroethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,1-Dichloroethene | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,2,4-Trichlorobenzene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 390 U | 390 U | 390 U | NA | |
| 1,2-Dibromo-3-chloropropane | NA | NA | NA | NA | NA | NA | |
| 1,2-Dibromoethane | NA | NA | NA | NA | NA | NA | |
| 1,2-Dichlorobenzene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 390 U | 390 U | 390 U | NA | |
| 1,2-Dichloroethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,2-Dichloroethene (total) | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,2-Dichloropropane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 1,3-Dichlorobenzene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 390 U | 390 U | 390 U | NA | |
| 1,4-Dichlorobenzene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 390 U | 390 U | 390 U | NA | |
| 2-Butanone | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 8 J | 12 U | 11 U | 12 U | 11 U | 12 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 UU | NA | |
| 2-Hexanone | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| 4-Methyl-2-pentanone | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Acetone | 16 | 13 U | 13 U | 16 | 23 U | 24 | 16 U | 15 U | 26 | 12 U | 11 J | 12 U | 11 U | 12 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Benzene | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 11 J | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Bromodichloromethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Bromoform | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Bromomethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Carbon disulfide | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 UU | NA | |
| Carbon tetrachloride | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Chlorobenzene | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Chloroethane | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U | 12 U | 12 U | 12 U | NA | |
| Chloroform | 13 U | 13 U | 13 U | 13 U | 23 U | 22 U | 16 U | 15 U | 11 U | 12 U | 12 U | 12 U</ | | | | | |

Attachment 2
MCAS Cherry Point OU1 - Site 16
Raw Analytical Data used in the Revised HHRA

| Station ID | OU1-SITE16-SO-04 | | OU1-SITE16-SO-05 | | OU1-SITE16-SO-06 | | OU1-SITE16-SO-07 | | OU1-SITE16-SO-08 | | OU1-SITE16-SO-09 | | OU1-SITE16-SO-10 | | OU1-SITE16-SO-17 | | OU1-SITE16-SO-18 | | OU1-SITE16-SO-19 | | OU1-SS1 | OU1-SS1 |
|----------------------------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------------|------------------|-----------------|---------|---------|
| Sample ID | SB04-0102 | SO04-0001 | SO05-0001 | SO06-0001 | SO07-0001 | SO08-0001 | SO09-0001 | SO10-0001 | SB17-0102 | SO17-0001 | SB18-0102 | SO18-0001 | SB19-0102 | SO19-0001 | SB19-0102 | SO19-0001 | OU1-SO-SS1-0001 | OU1-SO-SS1-0001 | OU1-SO-SS1-0001 | OU1-SO-SS1-0001 | | |
| Sample Date | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 10/30/94 | 05/19/01 | | | |
| Chemical Name | | | | | | | | | | | | | | | | | | | | | | |
| 4-Chloroaniline | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 390 U | 440 | | |
| 4-Chlorophenyl-phenylether | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 390 U | 440 | | |
| 4-Methylphenol | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 390 U | 440 | | |
| 4-Nitroaniline | 1,000 U | 1,000 U | 1,000 U | 1,100 U | 1,800 U | 1,700 U | 1,300 U | 1,200 U | 920 U | 950 U | 900 U | 950 U | 890 U | 950 U | 940 U | 950 U | 940 U | 950 U | 1,100 | | | |
| 4-Nitrophenol | 1,000 U | 1,000 U | 1,000 U | 1,100 U | 1,800 U | 1,700 U | 1,300 U | 1,200 U | 920 U | 950 U | 900 U | 950 U | 890 U | 950 U | 940 UJ | 950 U | 940 UJ | 950 U | 940 UJ | 1,100 | | |
| Acenaphthene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 29 J | 380 U | 390 U | 370 U | 390 U | 390 U | 440 | | |
| Acenaphthylene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 390 U | 440 | | |
| Acetophenone | NA | NA | NA | 440 | | |
| Anthracene | 22 J | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 67 J | 380 U | 390 U | 370 U | 390 U | 78 J | 440 | | |
| Atrazine | NA | NA | NA | 440 | | |
| Benzaldehyde | NA | NA | NA | 440 | | |
| Benzo(a)anthracene | 130 J | 47 J | 47 J | 440 U | 78 J | 160 J | 87 J | 200 J | 37 J | 60 J | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 34 J | 340 J | 440 | | | |
| Benzo(a)pyrene | 170 J | 42 J | 64 J | 440 U | 80 J | 190 J | 97 J | 200 J | 54 J | 65 J | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 30 J | 330 J | 440 | | | |
| Benzo(b)fluoranthene | 180 J | 50 J | 120 J | 23 J | 160 J | 470 J | 110 J | 310 J | 56 J | 120 J | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 82 J | 410 J | 440 | | | |
| Benzo(g,h,i)perylene | 140 J | 41 J | 71 J | 440 U | 68 J | 160 J | 86 J | 230 J | 110 J | 58 J | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 210 J | 440 | | | | |
| Benzo(k)fluoranthene | 140 J | 51 J | 430 U | 440 U | 750 U | 720 U | 110 J | 210 J | 35 J | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 360 J | 440 | | | | |
| bis(2-Chloroethoxy)methane | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 440 | | | |
| bis(2-Chloroethyl)ether | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 440 | | | |
| bis(2-Ethylhexyl)phthalate | 44 J | 69 J | 1,600 | 72 J | 99 J | 120 J | 88 J | 200 J | 100 J | 67 J | 99 J | 140 J | 42 J | 70 J | 390 UJ | 440 | | | | | | |
| Butylbenzylphthalate | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 UU | 440 | | | | |
| Caprolactam | NA | NA | 440 | | | |
| Carbazole | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 28 J | 380 U | 390 U | 370 U | 390 U | 440 | | | |
| Chrysene | 160 J | 55 J | 73 J | 23 J | 120 J | 250 J | 110 J | 240 J | 64 J | 90 J | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 38 J | 410 J | 440 | | | |
| Dibenz(a,h)anthracene | 43 J | 420 U | 430 U | 440 U | 750 U | 56 J | 38 J | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 R | 440 | | | | |
| Dibenzofuran | 420 U | 420 U | 430 U | 440 U | 42 J | 40 J | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 390 U | 390 U | 440 | | | |
| Diethylphthalate | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 440 | | | |
| Dimethyl phthalate | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 440 | | | |
| Di-n-butylphthalate | 420 U | 29 J | 28 J | 290 J | 38 J | 39 J | 540 U | 490 U | 35 J | 22 J | 370 U | 390 U | 390 U | 440 | | |
| Di-n-octylphthalate | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 UU | 440 | | | |
| Fluoranthene | 160 J | 52 J | 76 J | 23 J | 140 J | 240 J | 140 J | 340 J | 56 J | 100 J | 370 U | 390 U | 370 U | 390 U | 370 U | 390 U | 51 J | 490 | 440 | | | |
| Fluorene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | 490 U | 380 U | 390 U | 370 U | 390 U | 390 U | 440 | | |
| Hexachlorobenzene | 420 U | 420 U | 430 U | 440 U | 750 U | 720 U | 540 U | | | | | | | | | | | | | | | |

Attachment 2
MCAS Cherry Point OU1 - Site 16
Analytical Data used in the Revised HHRA

| Station ID | OU1-SITE16-SO-04 | | OU1-SITE16-SO-05 | | OU1-SITE16-SO-06 | | OU1-SITE16-SO-07 | | OU1-SITE16-SO-08 | | OU1-SITE16-SO-09 | | OU1-SITE16-SO-10 | | OU1-SITE16-SO-17 | | OU1-SITE16-SO-18 | | OU1-SITE16-SO-19 | | OU1-SS1 | OU1-SS |
|--|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|--------------|------------------|----------|------------------|----|---------|--------|
| Sample ID | SB04-0102 | SO04-0001 | SO05-0001 | SO06-0001 | SO07-0001 | SO08-0001 | SO09-0001 | SO10-0001 | SB17-0102 | SO17-0001 | SB18-0102 | SO18-0001 | SB19-0102 | SO19-0001 | OU1-SO-SS1-0001 | OU1-SS1-0001 | OU1-SS1 | OU1-SS | | | | |
| Sample Date | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 08/01/95 | 10/30/94 | 05/19/01 | | | |
| Chemical Name | | | | | | | | | | | | | | | | | | | | | | |
| Heptachlor epoxide | 2.2 U | 2.2 U | 2.2 U | 2.3 U | 3.9 U | 3.7 U | 3 | 2.5 U | 2 U | 2 U | 1.9 U | 2 U | 1.9 U | 2 U | 1.9 U | 2 U | 2 U | 4 U | 2.2 | | | |
| Methoxychlor | 22 U | 22 U | 22 U | 23 U | 39 U | 37 U | 27 U | 25 U | 20 U | 20 U | 19 U | 20 U | 19 U | 20 U | 19 U | 20 U | 20 U | 40 U | 22 | | | |
| Toxaphene | 220 U | 220 U | 220 U | 230 U | 390 U | 370 U | 270 U | 250 U | 200 U | 200 U | 190 U | 200 U | 190 U | 200 U | 190 U | 200 U | 200 U | 400 U | 220 | | | |
| Total Metals (MG/KG) | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 2,540 | 2,450 | 3,320 | 8,470 | 14,500 | 12,300 | 7,080 | 6,880 | 3,460 | 5,350 | NA | 4,640 | 4,780 | 2,970 | 6,650 | 5,010 | | | | | | |
| Antimony | 14.5 | 1.6 | 1.1 U | 0.99 U | 1.8 U | 1.9 U | 1.3 U | 1.3 U | 0.45 U | 0.98 | NA | 0.48 U | 0.45 U | 0.49 U | 1.4 UJ | 0.73 | | | | | | |
| Arsenic | 2.8 | 1.9 | 2.6 | 1.5 U | 21.9 | 9.8 | 5.2 | 3.4 | 4 | 4.1 | NA | 1.8 | 2.3 | 3.5 | 70.9 J | 0.66 | | | | | | |
| Barium | 203 | 64.6 | 95.2 | 19 | 76.2 | 103 | 50.9 | 76.5 | 39.1 | 60.7 | NA | 25.2 | 18.1 | 32.8 | 191 | 15.4 | | | | | | |
| Beryllium | 0.26 U | 0.26 U | 0.28 U | 0.25 U | 0.91 | 0.54 | 0.34 | 0.38 | 0.22 U | 0.24 U | NA | 0.24 U | 0.22 U | 0.24 U | 1.4 | 0.078 | | | | | | |
| Boron | 5.6 | 1.7 | 3 | 2.5 | 8.6 | 13.4 | 5.8 | 19.6 | 2.1 | 1.2 | NA | 1.1 | 2.2 | 2.5 | NA | 2.4 | | | | | | |
| Cadmium | 0.52 | 0.31 | 24.5 | 0.25 U | 2.7 | 2.9 | 1.7 | 2.6 | 0.88 | 0.67 | NA | 0.46 | 0.22 U | 0.98 | 1.2 U | 0.048 | | | | | | |
| Calcium | 6,240 | 3,700 | 20,400 | 2,600 | 6,580 | 23,200 | 16,100 | 14,200 | 14,200 | 30,200 | NA | 25,500 | 11,700 | 5,910 | 3,860 J | 753 | | | | | | |
| Chromium | 10.2 | 11.1 | 15.5 | 10.4 | 87.7 | 34.9 | 21.8 | 18.9 | 10.7 | 7.4 | NA | 9.7 | 6 | 8.7 | 13 J | 4.9 | | | | | | |
| Cobalt | 1.3 | 1.6 | 2.3 | 0.68 | 5.7 | 3.5 | 2 | 3.2 | 1.2 | 1.1 | NA | 0.53 | 0.42 | 0.93 | 5.2 | 0.33 | | | | | | |
| Copper | 156 | 30.7 | 37.9 | 2.2 | 27.9 | 27.5 | 33.9 | 21.1 | 20.9 | 6.5 | NA | 6 | 2.2 | 18.8 | 36.2 J | 0.86 | | | | | | |
| Cyanide | 0.65 U | 0.65 U | 0.7 U | 0.62 U | 1.2 U | 1.2 U | 0.81 U | 0.79 U | 0.56 U | 0.59 U | NA | 0.6 U | 0.56 U | 0.61 U | 0.59 U | 0.19 | | | | | | |
| Iron | 4,540 | 7,680 | 17,200 | 3,420 | 19,000 | 18,000 | 6,960 | 7,500 | 6,810 | 5,110 | NA | 3,850 | 2,610 | 3,170 | 23,600 | 2,540 | | | | | | |
| Lead | 708 | 106 | 164 | 14.9 | 210 | 181 | 163 | 115 | 45 | 30.3 | NA | 29.3 | 40.8 | 84.2 | 57.7 | 6.2 | | | | | | |
| Magnesium | 552 | 702 | 949 | 674 | 1,960 | 1,740 | 1,420 | 1,930 | 2,570 | 1,100 | NA | 633 | 550 | 642 | 1,010 | 370 | | | | | | |
| Manganese | 50.1 | 59 | 84.7 | 23.6 | 181 | 75.3 | 59.2 | 55 | 44 | 46 | NA | 10.9 | 12.5 | 23.9 | 93.1 | 10.4 | | | | | | |
| Mercury | 0.13 U | 0.19 | 0.16 | 0.13 | 0.42 | 0.51 | 0.27 | 0.29 | 0.17 | 0.17 | NA | 0.12 U | 0.11 U | 0.8 | 14 J | 0.029 | | | | | | |
| Molybdenum | NA | NA | NA | 0.29 | | | | | | |
| Nickel | 3.4 | 10.4 | 12.1 | 2 | 15.6 | 11.3 | 7.9 | 10.4 | 9.7 | 2.2 | NA | 3.8 | 1.8 | 5.2 | 16.5 | 1.7 | | | | | | |
| Potassium | 246 | 199 | 223 | 314 | 861 | 885 | 475 | 683 | 327 | 434 | NA | 500 | 519 | 321 | 442 | 239 | | | | | | |
| Selenium | 1.3 U | 1.3 U | 1.4 U | 1.2 U | 2.3 U | 2.3 U | 1.6 U | 1.6 U | 0.5 | 0.51 | NA | 0.79 | 0.94 | 0.97 | 0.73 | 0.44 | | | | | | |
| Silver | 0.32 | 6.6 | 0.63 | 0.25 U | 0.82 | 0.72 | 0.44 | 0.42 | 0.22 U | 0.24 U | NA | 0.24 U | 0.22 U | 0.24 U | 0.71 UJ | 0.21 | | | | | | |
| Sodium | 488 | 360 | 582 | 752 | 1,890 | 1,380 | 232 | 741 | 50.7 | 61.2 | NA | 53 | 34.5 | 248 | 574 | 70.1 | | | | | | |
| Thallium | 1.5 U | 1.6 U | 1.7 U | 1.5 U | 2.8 U | 2.8 U | 1.9 U | 1.9 U | 0.67 U | 0.71 U | NA | 0.72 U | 0.67 U | 0.73 U | 1.1 J | 0.57 | | | | | | |
| Vanadium | 6.8 | 6.7 | 8 | 11.6 | 46.4 | 40.2 | 26.6 | 26.5 | 11.1 | 8.2 | NA | 18.2 | 6.9 | 9.5 | 35.5 | 7.6 | | | | | | |
| Zinc | 416 | 142 | 252 | 27.3 | 237 | 935 | 646 | 2,390 | 139 | 53.7 | NA | 48.7 | 15.3 | 549 | 779 | 11.6 | | | | | | |
| Wet Chemistry | | | | | | | | | | | | | | | | | | | | | | |
| % Solids (pct) | NA | NA | NA | NA | NA | NA | 75 | |
| Cation Exchange Capacity (MEQ/100G) (meq/100g) | NA | NA | NA | NA | NA | NA | 16 | |
| Cation Exchange Capacity (MEQ/100G) (mg/kg) | NA | NA | NA | NA | NA | NA | NA | |
| Oil & Grease - HEM (mg/kg) | NA | NA | NA | NA | NA | NA | NA | |
| Oil & Grease - HEM (ug/kg) | 458 | 82 | 117 | 24 | 31.8 | 50.6 | 53.7 | 403 | NA | 71 | 14.6 | 46.4 | 112 | 311 | NA | NA | NA | NA | NA | NA | NA | |
| pH (ph) | NA | NA | NA | NA | NA | NA | 6 | |
| Total organic carbon (TOC) (mg/kg) | NA | NA | NA | NA | NA | NA | 14,000 | |
| Total Petroleum Hydrocarbons (UG/KG) | | | | | | | | | | | | | | | | | | | | | | |
| Fuel oil #6 | 1.3 U | 1.3 U | 1.3 U | 1.3 U | 2.3 U | 2.2 U | 1.6 U | 1.5 U | NA | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | NA | NA | NA | | |
| JP-4 | 1.3 U | 1.3 U | 1.3 U | 1.3 U | 2.3 U | 2.2 U | 1.6 U | 1.5 U | NA | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | NA | NA | NA | | |
| Kerosene | 1.3 U | 1.3 U | 1.3 U | 1.3 U | 2.3 U | 2.2 U | 1.6 U | 1.5 U | NA | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | NA | NA | NA | | |
| Naphtha | 1.3 U | 1.3 U | 1.3 U | 1.3 U | 2.3 U | 2.2 U | 1.6 U | 1.5 U | NA | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | NA | NA | NA | | |
| TPH-diesel range | 1.3 U | 1.3 U | 1.3 U | 1.3 U | 2.3 U | 2.2 U | 1.6 U | 1.5 U | NA | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | 1.2 U | 1.1 U | NA | NA | NA | | |
| TPH-gas range | 12.7 U | 12.6 U | 13 U | 13.3 U | 22.7 U | 22 U | 16.3 U | 23 | NA | 14.1 | 11.2 U | 11.9 U | 14.3 | 16.3 | NA | NA | NA | NA | NA | NA | | |

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

I Analyte present, value may or may not be accurate or reliable.

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

U - The material was analyzed for, but not detected

U.U - Analyte not detected, quantitation limit may be inaccurate

MEG/1000 - Millions of plants per 100 square miles

MEQ/100G - Milliequivalents per 100 grams

MG/RG - Milligrams per Kilogram
PCT - Percent

PCT - Percent
PUI - PUI units

pH - pH units
HC/KC - Molar

UG/RG - MICH

Attachment 2
MCAS Cherry Point OU1 - Site 16
Raw Analytical Data used in the Revised HHRA

| Station ID | 100 | OU1-SS-101 | OU1-SS-102 | OU1-SS-103 | OU1-SS-104 | OU1-SS-105 | OU1-SS-106 | OU1-SS-107 | OU1-SS2 | OU1-SS3 | OU1-SS4 | |
|---|-------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|-----------------|-----------------|-----------------|
| Sample ID | 0-04B | OU1-SS-101-04B | OU1-SS-102-04B | OU1-SS-103-04B | OU1-SS-104-04B | OU1-SS-105-04B | OU1-SS-106-04B | OU1-SS-106P-04B | OU1-SS-107-04B | OU1-SO-SS2-0001 | OU1-SO-SS3-0001 | OU1-SO-SS4-0001 |
| Sample Date | 04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 10/30/94 | 10/30/94 | 10/30/94 |
| Chemical Name | | | | | | | | | | | | |
| Volatile Organic Compounds (UG/KG) | | | | | | | | | | | | |
| 1,1,1-Trichloroethane | | NA | 18 U | 17 U | 28 U | |
| 1,1,2,2-Tetrachloroethane | | NA | 18 U | 17 U | 28 U | |
| 1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113) | | NA | NA | NA | NA | |
| 1,1-Dichloroethane | | NA | 18 U | 17 U | 28 U | |
| 1,1-Dichloroethene | | NA | 18 U | 17 U | 28 U | |
| 1,2,4-Trichlorobenzene | | NA | 610 U | 560 U | 940 U | |
| 1,2-Dibromo-3-chloropropane | | NA | NA | NA | NA | |
| 1,2-Dibromoethane | | NA | NA | NA | NA | |
| 1,2-Dichlorobenzene | | NA | 610 U | 560 U | 940 U | |
| 1,2-Dichloroethane | | NA | 18 U | 17 U | 28 U | |
| 1,2-Dichloroethene (total) | | NA | 18 U | 17 U | 28 U | |
| 1,2-Dichloropropane | | NA | 18 U | 17 U | 28 U | |
| 1,3-Dichlorobenzene | | NA | 610 U | 560 U | 940 U | |
| 1,4-Dichlorobenzene | | NA | 610 U | 560 U | 940 U | |
| 2-Butanone | | NA | 18 UJ | 17 UJ | 28 U | |
| 2-Hexanone | | NA | 18 U | 17 U | 28 U | |
| 4-Methyl-2-pentanone | | NA | 18 U | 17 U | 28 U | |
| Acetone | | NA | NA | 18 U | 21 U | 28 U |
| Benzene | | NA | 18 U | 17 U | 28 U | |
| Bromodichloromethane | | NA | 18 U | 17 U | 28 U | |
| Bromoform | | NA | 18 U | 17 U | 28 U | |
| Bromomethane | | NA | 18 U | 17 U | 28 U | |
| Carbon disulfide | | NA | 18 U | 17 U | 28 U | |
| Carbon tetrachloride | | NA | 18 U | 17 U | 28 U | |
| Chlorobenzene | | NA | 18 U | 17 U | 28 U | |
| Chloroethane | | NA | 18 U | 17 U | 28 U | |
| Chloroform | | NA | 18 U | 17 U | 28 U | |
| Chloromethane | | NA | 18 U | 17 U | 28 U | |
| cis-1,2-Dichloroethene | | NA | NA | NA | NA | |
| cis-1,3-Dichloropropene | | NA | 18 U | 17 U | 28 U | |
| Cyclohexane | | NA | NA | NA | NA | |
| Dibromochloromethane | | NA | 18 U | 17 U | 28 U | |
| Dichlorodifluoromethane (Freon-12) | | NA | NA | NA | NA | |
| Ethylbenzene | | NA | 18 U | 17 U | 28 U | |
| Isopropylbenzene | | NA | NA | NA | NA | |
| Methyl acetate | | NA | NA | NA | NA | |
| Methylcyclohexane | | NA | NA | NA | NA | |
| Methylene chloride | | NA | 18 U | 17 U | 15 J | |
| Methyl-tert-butyl ether (MTBE) | | NA | NA | NA | NA | |
| Styrene | | NA | 18 U | 17 U | 28 U | |
| Tetrachloroethene | | NA | 18 U | 17 U | 28 U | |
| Toluene | | NA | 18 U | 17 U | 28 U | |
| trans-1,2-Dichloroethene | | NA | NA | NA | NA | |
| trans-1,3-Dichloropropene | | NA | 18 U | 17 U | 28 U | |
| Trichloroethene | | NA | 18 U | 17 U | 28 U | |
| Trichlorofluoromethane (Freon-11) | | NA | NA | NA | NA | |
| Vinyl chloride | | NA | 18 UJ | 17 UJ | 28 UJ | |
| Xylene, total | | NA | 18 U | 17 U | 28 U | |
| Semivolatile Organic Compounds (UG/KG) | | | | | | | | | | | | |
| 1,1-Biphenyl | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | NA | NA | NA |
| 2,2-Oxybis(1-chloropropane) | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 UJ | 560 UJ | 940 UJ |
| 2,4,5-Trichlorophenol | U | 1,200 U | 1,000 U | 890 U | 930 U | 1,300 U | 900 U | 1,000 U | 1,000 U | 1,500 U | 1,400 U | 2,300 U |
| 2,4,6-Trichlorophenol | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2,4-Dichlorophenol | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2,4-Dimethylphenol | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2,4-Dinitrophenol | U | 1,200 U | 1,000 U | 890 U | 930 U | 1,300 U | 900 U | 1,000 U | 1,000 U | 1,500 UJ | 1,400 UJ | 2,300 UJ |
| 2,4-Dinitrotoluene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2,6-Dinitrotoluene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2-Choronaphthalene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2-Chlorophenol | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2-Methylnaphthalene | U | 470 U | 400 U | 360 U | 370 U | 200 J | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2-Methylphenol | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 2-Nitroaniline | U | 1,200 U | 1,000 U | 890 U | 930 U | 1,300 U | 900 U | 1,000 U | 1,000 U | 1,500 U | 1,400 U | 2,300 U |

Attachment 2
MCAS Cherry Point OU1 - Site 16
Raw Analytical Data used in the Revised HHRA

| Station ID | 100 | OU1-SS-101 | OU1-SS-102 | OU1-SS-103 | OU1-SS-104 | OU1-SS-105 | OU1-SS-106 | OU1-SS-107 | OU1-SS2 | OU1-SS3 | OU1-SS4 | |
|--|-------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|-----------------|-----------------|-----------------|
| Sample ID | 0-04B | OU1-SS-101-04B | OU1-SS-102-04B | OU1-SS-103-04B | OU1-SS-104-04B | OU1-SS-105-04B | OU1-SS-106-04B | OU1-SS-106P-04B | OU1-SS-107-04B | OU1-SO-SS2-0001 | OU1-SO-SS3-0001 | OU1-SO-SS4-0001 |
| Sample Date | 4 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 10/30/94 | 10/30/94 | 10/30/94 |
| Chemical Name | | | | | | | | | | | | |
| 4-Chloroaniline | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 4-Chlorophenyl-phenylether | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 4-Methylphenol | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| 4-Nitroaniline | U | 1,200 U | 1,000 U | 890 U | 930 U | 1,300 U | 900 U | 1,000 U | 1,000 U | 1,500 U | 1,400 U | 2,300 U |
| 4-Nitrophenol | U | 1,200 U | 1,000 U | 890 U | 930 U | 1,300 U | 900 U | 1,000 U | 1,000 U | 1,500 U | 1,400 U | 2,300 U |
| Acenaphthene | U | 53 J | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Acenaphthylene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Acetophenone | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | NA | NA | NA |
| Anthracene | U | 56 J | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Atrazine | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | NA | NA | NA |
| Benzaldehyde | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | NA | NA | NA |
| Benzo(a)anthracene | U | 450 J | 110 J | 360 U | 370 U | 170 J | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Benzo(a)pyrene | U | 1,100 J | 95 J | 360 U | 370 U | 150 J | 360 U | 410 U | 410 U | 610 U | 560 U | 190 J |
| Benzo(b)fluoranthene | U | 2,400 J | 300 J | 360 U | 370 U | 340 J | 360 U | 410 U | 410 U | 610 U | 170 J | 340 J |
| Benzo(g,h,i)perylene | U | 2,700 J | 130 J | 360 U | 370 U | 160 J | 360 U | 410 U | 410 U | 610 U | 560 U | 940 UJ |
| Benzo(k)fluoranthene | U | 2,100 J | 73 J | 360 U | 370 U | 120 J | 360 U | 410 U | 410 U | 610 U | 110 J | 280 J |
| bis(2-Chloroethoxy)methane | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| bis(2-Chloroethyl)ether | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| bis(2-Ethylhexyl)phthalate | U | 3,600 J | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Butylbenzylphthalate | U | 470 R | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 610 J |
| Caprolactam | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | NA | NA | NA |
| Carbazole | U | 87 J | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Chrysene | U | 1,300 J | 210 J | 360 U | 370 U | 270 J | 360 U | 410 U | 410 U | 610 U | 110 J | 220 J |
| Dibenz(a,h)anthracene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 UJ |
| Dibenzofuran | U | 470 U | 400 U | 360 U | 370 U | 59 J | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Diethylphthalate | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Dimethyl phthalate | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Di-n-butylphthalate | U | 73 J | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Di-n-octylphthalate | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 UJ |
| Fluoranthene | U | 790 J | 150 J | 360 U | 370 U | 320 J | 360 U | 410 U | 410 U | 610 U | 560 U | 320 J |
| Fluorene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Hexachlorobenzene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Hexachlorobutadiene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Hexachlorocyclopentadiene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 UJJ | 560 U | 940 UJ |
| Hexachloroethane | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Indeno(1,2,3-cd)pyrene | U | 2,700 R | 110 J | 360 U | 370 U | 140 J | 360 U | 410 U | 410 U | 610 U | 560 U | 940 UJ |
| Isophorone | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Naphthalene | U | 51 J | 400 U | 360 U | 370 U | 110 J | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| n-Nitroso-di-n-propylamine | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| n-Nitrosodiphenylamine | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Nitrobenzene | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Pentachlorophenol | U | 1,200 U | 1,000 U | 890 U | 930 U | 1,300 U | 900 U | 1,000 U | 1,000 U | 1,500 U | 1,400 U | 2,300 U |
| Phenanthrene | U | 410 J | 400 U | 360 U | 370 U | 290 J | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Phenol | U | 470 U | 400 U | 360 U | 370 U | 510 U | 360 U | 410 U | 410 U | 610 U | 560 U | 940 U |
| Pyrene | U | 650 J | 180 J | 360 U | 370 U | 280 J | 360 U | 410 U | 410 U | 610 U | 560 U | 280 J |
| Pesticide/Polychlorinated Biphenyls (UG/KG) | | | | | | | | | | | | |
| 4,4'-DDD | U | 5 J | 4 U | 3.6 U | 2.4 J | 5.1 U | 3.6 U | 4.1 U | 4.1 U | 12 U | 11 U | 19 U |
| 4,4'-DDE | U | 4.7 U | 1.5 J | 3.6 U | 4.3 | 21 | 3.6 U | 4.1 U | 4.1 U | 5.3 J | 3 J | 11 J |
| 4,4'-DDT | U | 190 J | 6.1 | 3.6 U | 30 J | 21 | 3.6 U | 4.1 U | 4.1 U | 12 U | 11 U | 19 U |
| Aldrin | U | 2.3 U | 2 U | 1.8 U | 1.9 U | 2.6 U | 1.8 U | 2 U | 2 U | 6.3 U | 5.9 U | 9.7 U |
| alpha-BHC | U | 2.3 U | 2 U | 1.8 U | 4.5 | 2.6 U | 1.8 U | 2 U | 2 U | 6.3 U | 5.9 U | 9.7 U |
| alpha-Chlordane | U | 19 J | 2 U | 1.8 U | 1.9 U | 2.6 U | 1.8 U | 2 U | 2 U | 29 J | 5.9 U | 9.7 U |
| Aroclor-1016 | U | 47 U | 40 U | 36 U | 37 U | 51 U | 36 U | 41 U | | | | |

Attachment 2
MCAS Cherry Point OU1 - Site 16
Raw Analytical Data used in the Revised HHRA

| Station ID | 100 | OU1-SS-101 | OU1-SS-102 | OU1-SS-103 | OU1-SS-104 | OU1-SS-105 | OU1-SS-106 | OU1-SS-107 | OU1-SS-2 | OU1-SS-3 | OU1-SS-4 |
|--|-------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|-----------------|-----------------|
| Sample ID | 0-04B | OU1-SS-101-04B | OU1-SS-102-04B | OU1-SS-103-04B | OU1-SS-104-04B | OU1-SS-105-04B | OU1-SS-106-04B | OU1-SS-106P-04B | OU1-SS-107-04B | OU1-SO-SS2-0001 | OU1-SO-SS3-0001 |
| Sample Date | 04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 05/19/04 | 10/30/94 | 10/30/94 |
| Chemical Name | | | | | | | | | | | |
| Heptachlor epoxide | U | 2.3 U | 2 U | 1.8 U | 1.9 U | 2.6 U | 1.8 U | 2 U | 2 U | 6.3 U | 5.9 U |
| Methoxychlor | U | 23 U | 20 U | 18 U | 19 U | 26 U | 18 U | 20 U | 20 U | 63 U | 59 U |
| Toxaphene | U | 230 U | 200 U | 180 U | 190 U | 260 U | 180 U | 200 U | 200 U | 630 U | 590 U |
| Total Metals (MG/KG) | | | | | | | | | | | |
| Aluminum | | 10,400 | 4,780 | 4,060 | 4,150 | 20,200 | 4,090 | 4,130 | 4,480 | 35,800 | 18,600 |
| Antimony | UJ | 1.3 J | 0.87 UJ | 0.73 UJ | 0.76 UJ | 1.5 J | 0.74 UJ | 0.87 UJ | 0.82 UJ | 2.2 UJ | 2.1 UJ |
| Arsenic | J | 3.4 | 1.5 J | 0.58 J | 0.6 J | 9.9 | 0.56 U | 0.66 U | 0.63 U | 11.1 J | 8.9 J |
| Barium | J | 816 | 16.9 J | 16 J | 15 J | 89.4 | 14.8 J | 14.3 J | 15.6 J | 86.5 | 74.2 |
| Beryllium | J | 0.27 J | 0.075 J | 0.093 J | 0.056 J | 0.74 J | 0.048 U | 0.057 U | 0.067 J | 1.1 | 0.68 |
| Boron | U | 40.5 | 3.2 | 2.4 U | 2.5 U | 12.4 | 2.4 U | 2.8 U | 2.7 U | NA | NA |
| Cadmium | U | 2.7 | 0.39 J | 0.061 J | 0.05 U | 2.2 | 0.048 U | 0.057 U | 0.054 U | 1.9 U | 2.7 |
| Calcium | J | 34,600 | 6,990 | 2,010 | 765 J | 14,500 | 722 J | 738 J | 943 | 17,700 J | 38,400 J |
| Chromium | J | 25.7 J | 7.7 J | 3.7 J | 3.7 J | 46.5 J | 3.5 J | 3.7 J | 3.9 J | 46 J | 38.3 J |
| Cobalt | J | 1.7 J | 0.58 J | 0.2 J | 0.2 U | 4.4 J | 0.2 J | 0.23 U | 0.21 U | 4.1 | 3.4 |
| Copper | J | 19.3 J | 4.8 J | 1.8 J | 1 J | 24.1 J | 0.85 J | 0.88 J | 1.1 J | 62 J | 27.7 J |
| Cyanide | U | 0.19 U | 0.16 U | 0.14 U | 0.15 U | 0.24 U | 0.15 U | 0.18 U | 0.16 U | 0.93 U | 0.86 U |
| Iron | | 6,560 | 3,050 | 2,010 | 2,000 | 13,900 | 2,130 | 2,190 | 2,390 | 22,700 | 20,800 |
| Lead | | 130 | 31.6 | 5.4 | 5.7 | 137 | 5.7 | 5.6 | 6.5 | 82.4 | 167 |
| Magnesium | J | 1,560 | 413 J | 571 J | 285 J | 1,590 | 280 J | 291 J | 414 J | 2,610 | 2,190 |
| Manganese | | 49.2 | 17.6 | 24.8 | 17.6 | 152 | 15.8 | 16.5 | 19 | 64.9 | 131 |
| Mercury | J | 0.21 | 0.047 | 0.029 J | 0.017 J | 0.43 | 0.027 J | 0.031 J | 0.028 J | 1.3 J | 0.31 J |
| Molybdenum | U | 0.76 J | 0.34 U | 0.29 U | 0.34 J | 0.9 J | 0.29 U | 0.34 U | 0.32 U | NA | NA |
| Nickel | J | 9.5 J | 2.3 J | 1.2 J | 1.3 J | 15 J | 1.1 J | 1.1 J | 1.2 J | 12.6 | 6.8 U |
| Potassium | J | 614 J | 290 J | 216 J | 164 J | 1,250 J | 194 J | 204 J | 193 J | 1,630 | 1,250 |
| Selenium | U | 0.63 J | 0.53 U | 0.45 U | 0.46 U | 1 J | 0.45 U | 0.53 U | 0.61 J | 0.74 | 0.82 |
| Silver | U | 0.76 J | 0.25 U | 0.21 U | 0.22 U | 0.38 J | 0.21 U | 0.24 U | 0.23 U | 1.1 UJ | 1 UJ |
| Sodium | J | 179 J | 73.6 J | 131 J | 76.5 J | 287 J | 308 J | 69.5 J | 63.5 J | 2,210 | 1,040 |
| Thallium | U | 0.75 U | 0.68 U | 0.57 U | 0.6 U | 1.2 J | 0.58 U | 0.68 U | 0.64 U | 0.37 U | 0.34 U |
| Vanadium | J | 23.9 | 10 | 6.1 J | 5.9 J | 51.1 | 6 J | 6.2 J | 6.5 J | 93.1 | 58.8 |
| Zinc | | 123 | 57.1 | 10.8 | 11 | 713 | 5.8 | 6.2 | 10.4 | 551 | 2,970 |
| Wet Chemistry | | | | | | | | | | | |
| % Solids (ppt) | | 72 | 83 | 94 | 89 | 65 | 92 | 82 | 82 | NA | NA |
| Cation Exchange Capacity (MEQ/100G) (meq/100g) | | 31 | 38 | 17 | 16 | 73 | 20 | 17 | 17 | NA | NA |
| Cation Exchange Capacity (MEQ/100G) (mg/kg) | | NA | NA | NA | NA |
| Oil & Grease - HEM (mg/kg) | | NA | NA | NA | NA |
| Oil & Grease - HEM (ug/kg) | | NA | NA | NA | NA |
| pH (ph) | | 7.6 | 7.2 | 6.6 | 5.9 | 7.2 | 5.1 | 5.4 | 6.4 | NA | NA |
| Total organic carbon (TOC) (mg/kg) | | 53,000 | 47,000 | 21,000 | 25,000 | 190,000 | 29,000 | 27,000 | 19,000 | NA | NA |
| Total Petroleum Hydrocarbons (UG/KG) | | | | | | | | | | | |
| Fuel oil #6 | | NA | NA | NA | NA |
| JP-4 | | NA | NA | NA | NA |
| Kerosene | | NA | NA | NA | NA |
| Naphtha | | NA | NA | NA | NA |
| TPH-diesel range | | NA | NA | NA | NA |
| TPH-gas range | | NA | NA | NA | NA |

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Notes:

Shading indicates detections

NA - Not analyzed

B - Analyte not detected above the level reported in blanks

J - Analyte present, value may or may not be accurate or precise

R - Unreliable Result

U - The material was analyzed for, but not detected

UU - Analyte not detected, quantitation limit may be inaccurate

MEQ/100G - Milliequivalents per 100 grams

MG/KG - Milligrams per kilogram

PCT - Percent

PH - pH units

UG/KG - Micrograms per kilogram

Appendix B

Monitoring Well 16GW48 Laboratory Data and

Well Installation Diagram

ANALYTICAL REPORT

Job Number: 680-57992-1

SDG Number: CHP57992-1

Job Description: MCAS - Cherry Point, OU1-Site 16

For:

Rhea Engineers & Consultants, Inc.
4975 William Flynn Hwy
Suite 14
Gibsonia, PA 15044

Attention: Mr. Brad McCalla

Kathryn Smith

Approved for release.
Kathryn Smith
Project Manager I
6/17/2010 12:30 PM

Kathryn Smith
Project Manager I
kathye.smith@testamericainc.com
06/17/2010

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. All questions regarding this report should be directed to the TestAmerica Project Manager who signed this report.

**Job Narrative
680-57992-1**

Comments

No additional comments.

Receipt

All samples were received in good condition within temperature requirements.

GC/MS VOA

No analytical or quality issues were noted.

HPLC

No analytical or quality issues were noted.

GC Semi VOA

Method(s) 8081A_8082: This method incorporates the use of second column confirmation. Corrective action for unacceptable percent recovery is not taken for surrogate or spike compounds unless the results from both columns are outside criteria. Any results which fall outside criteria are qualified and reported.

No other analytical or quality issues were noted.

Organic Prep

No analytical or quality issues were noted.

VOA Prep

No analytical or quality issues were noted.

METHOD SUMMARY

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1

Sdg Number: CHP57992-1

| Description | Lab Location | Method | Preparation Method |
|--|--------------|------------------|--------------------|
| Matrix Water | | | |
| Volatile Organic Compounds (GC/MS) Purge and Trap | TAL SAV | SW846 8260B | SW846 5030B |
| Organochlorine Pesticides & PCBs (GC) Liquid-Liquid Extraction (Continuous) | TAL SAV | SW846 8081A_8082 | SW846 3520C |
| PAHs (HPLC) Liquid-Liquid Extraction (Continuous) | TAL PEN | SW846 8310 | SW846 3520C |

Lab References:

TAL PEN = TestAmerica Pensacola

TAL SAV = TestAmerica Savannah

Method References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

METHOD / ANALYST SUMMARY

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

| Method | Analyst | Analyst ID |
|------------------|-----------------|------------|
| SW846 8260B | Lanier, Carolyn | CL |
| SW846 8081A_8082 | Kellar, Joshua | JK |
| SW846 8310 | Chea, Vando | VC |

SAMPLE SUMMARY

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

| Lab Sample ID | Client Sample ID | Client Matrix | Date/Time Sampled | Date/Time Received |
|---------------|------------------|---------------|-------------------|--------------------|
| 680-57992-1 | OU1-16GW48 | Water | 05/25/2010 1425 | 05/26/2010 0905 |
| 680-57992-2 | Trip Blank | Water | 05/25/2010 0000 | 05/26/2010 0905 |

Analytical Data

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1Client Sample ID: **OU1-16GW48**Lab Sample ID: 680-57992-1
Client Matrix: WaterDate Sampled: 05/25/2010 1425
Date Received: 05/26/2010 0905**8260B Volatile Organic Compounds (GC/MS)**

| | | | | |
|----------------|-----------------|----------------------------|------------------------|---------|
| Method: | 8260B | Analysis Batch: 680-170708 | Instrument ID: | MSP |
| Preparation: | 5030B | | Lab File ID: | p0069.d |
| Dilution: | 1.0 | | Initial Weight/Volume: | 5 mL |
| Date Analyzed: | 06/05/2010 1409 | | Final Weight/Volume: | 5 mL |
| Date Prepared: | 06/05/2010 1409 | | | |

| Analyte | Result (ug/L) | Qualifier | MDL | RL |
|-----------------------------|---------------|-----------|------|------|
| Acetone | 5.0 | U | 5.0 | 25 |
| Benzene | 0.42 | J | 0.25 | 1.0 |
| Bromoform | 0.50 | U | 0.50 | 1.0 |
| Bromomethane | 0.80 | U | 0.80 | 1.0 |
| 2-Butanone (MEK) | 1.0 | U | 1.0 | 10 |
| Carbon disulfide | 0.60 | U | 0.60 | 2.0 |
| Carbon tetrachloride | 0.50 | U | 0.50 | 1.0 |
| Chlorobenzene | 10 | | 0.25 | 1.0 |
| Chlorodibromomethane | 0.10 | U | 0.10 | 1.0 |
| Chloroethane | 1.0 | U | 1.0 | 1.0 |
| Chloroform | 0.14 | U | 0.14 | 1.0 |
| Chloromethane | 0.33 | U | 0.33 | 1.0 |
| cis-1,2-Dichloroethene | 5.3 | | 0.15 | 1.0 |
| cis-1,3-Dichloropropene | 0.11 | U | 0.11 | 1.0 |
| Dichlorobromomethane | 0.25 | U | 0.25 | 1.0 |
| 1,1-Dichloroethane | 0.25 | U | 0.25 | 1.0 |
| 1,2-Dichloroethane | 4.5 | | 0.10 | 1.0 |
| 1,1-Dichloroethene | 0.11 | U | 0.11 | 1.0 |
| 1,2-Dichloropropane | 0.13 | U | 0.13 | 1.0 |
| Ethylbenzene | 0.11 | U | 0.11 | 1.0 |
| 2-Hexanone | 1.0 | U | 1.0 | 10 |
| Methylene Chloride | 1.0 | U | 1.0 | 5.0 |
| 4-Methyl-2-pentanone (MIBK) | 1.0 | U | 1.0 | 10 |
| Styrene | 0.11 | U | 0.11 | 1.0 |
| 1,1,2,2-Tetrachloroethane | 0.18 | U | 0.18 | 1.0 |
| Tetrachloroethene | 1.1 | | 0.15 | 1.0 |
| Toluene | 0.33 | U | 0.33 | 1.0 |
| trans-1,2-Dichloroethene | 1.2 | | 0.20 | 1.0 |
| trans-1,3-Dichloropropene | 0.21 | U | 0.21 | 1.0 |
| 1,1,1-Trichloroethane | 0.50 | U | 0.50 | 1.0 |
| 1,1,2-Trichloroethane | 0.13 | U | 0.13 | 1.0 |
| Trichloroethene | 6.4 | | 0.13 | 1.0 |
| Vinyl chloride | 1.5 | | 0.18 | 0.50 |
| Xylenes, Total | 0.20 | U | 0.20 | 2.0 |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|----------------------|------|-----------|-------------------|
| 4-Bromofluorobenzene | 84 | | 75 - 120 |
| Dibromofluoromethane | 96 | | 75 - 121 |
| Toluene-d8 (Surr) | 100 | | 75 - 120 |

Analytical Data

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1Client Sample ID: **Trip Blank**Lab Sample ID: 680-57992-2
Client Matrix: WaterDate Sampled: 05/25/2010 0000
Date Received: 05/26/2010 0905**8260B Volatile Organic Compounds (GC/MS)**

| | | | | |
|----------------|-----------------|----------------------------|------------------------|---------|
| Method: | 8260B | Analysis Batch: 680-170708 | Instrument ID: | MSP |
| Preparation: | 5030B | | Lab File ID: | p0067.d |
| Dilution: | 1.0 | | Initial Weight/Volume: | 5 mL |
| Date Analyzed: | 06/05/2010 1330 | | Final Weight/Volume: | 5 mL |
| Date Prepared: | 06/05/2010 1330 | | | |

| Analyte | Result (ug/L) | Qualifier | MDL | RL |
|-----------------------------|---------------|-----------|-------------------|------|
| Acetone | 5.0 | U | 5.0 | 25 |
| Benzene | 0.25 | U | 0.25 | 1.0 |
| Bromoform | 0.50 | U | 0.50 | 1.0 |
| Bromomethane | 0.80 | U | 0.80 | 1.0 |
| 2-Butanone (MEK) | 1.0 | U | 1.0 | 10 |
| Carbon disulfide | 0.60 | U | 0.60 | 2.0 |
| Carbon tetrachloride | 0.50 | U | 0.50 | 1.0 |
| Chlorobenzene | 0.25 | U | 0.25 | 1.0 |
| Chlorodibromomethane | 0.10 | U | 0.10 | 1.0 |
| Chloroethane | 1.0 | U | 1.0 | 1.0 |
| Chloroform | 0.14 | U | 0.14 | 1.0 |
| Chloromethane | 0.33 | U | 0.33 | 1.0 |
| cis-1,2-Dichloroethene | 0.15 | U | 0.15 | 1.0 |
| cis-1,3-Dichloropropene | 0.11 | U | 0.11 | 1.0 |
| Dichlorobromomethane | 0.25 | U | 0.25 | 1.0 |
| 1,1-Dichloroethane | 0.25 | U | 0.25 | 1.0 |
| 1,2-Dichloroethane | 0.10 | U | 0.10 | 1.0 |
| 1,1-Dichloroethene | 0.11 | U | 0.11 | 1.0 |
| 1,2-Dichloropropane | 0.13 | U | 0.13 | 1.0 |
| Ethylbenzene | 0.11 | U | 0.11 | 1.0 |
| 2-Hexanone | 1.0 | U | 1.0 | 10 |
| Methylene Chloride | 1.0 | U | 1.0 | 5.0 |
| 4-Methyl-2-pentanone (MIBK) | 1.0 | U | 1.0 | 10 |
| Styrene | 0.11 | U | 0.11 | 1.0 |
| 1,1,2,2-Tetrachloroethane | 0.18 | U | 0.18 | 1.0 |
| Tetrachloroethene | 0.15 | U | 0.15 | 1.0 |
| Toluene | 0.33 | U | 0.33 | 1.0 |
| trans-1,2-Dichloroethene | 0.20 | U | 0.20 | 1.0 |
| trans-1,3-Dichloropropene | 0.21 | U | 0.21 | 1.0 |
| 1,1,1-Trichloroethane | 0.50 | U | 0.50 | 1.0 |
| 1,1,2-Trichloroethane | 0.13 | U | 0.13 | 1.0 |
| Trichloroethene | 0.13 | U | 0.13 | 1.0 |
| Vinyl chloride | 0.18 | U | 0.18 | 0.50 |
| Xylenes, Total | 0.20 | U | 0.20 | 2.0 |
| Surrogate | %Rec | Qualifier | Acceptance Limits | |
| 4-Bromofluorobenzene | 86 | | 75 - 120 | |
| Dibromofluoromethane | 97 | | 75 - 121 | |
| Toluene-d8 (Surr) | 100 | | 75 - 120 | |

Analytical Data

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Client Sample ID: OU1-16GW48

Lab Sample ID: 680-57992-1
Client Matrix: Water

Date Sampled: 05/25/2010 1425
Date Received: 05/26/2010 0905

8081A_8082 Organochlorine Pesticides & PCBs (GC)

| | | | | |
|----------------|-----------------|----------------------------|------------------------|---------|
| Method: | 8081A_8082 | Analysis Batch: 680-170183 | Instrument ID: | SGM |
| Preparation: | 3520C | Prep Batch: 680-169889 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 05/28/2010 2347 | | Injection Volume: | 2 uL |
| Date Prepared: | 05/27/2010 1448 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | RL |
|------------------------|---------------|-----------|-------------------|-------|
| Aldrin | 0.0068 | U | 0.0068 | 0.049 |
| alpha-BHC | 0.0055 | U | 0.0055 | 0.049 |
| beta-BHC | 0.0065 | U | 0.0065 | 0.049 |
| Chlordane (technical) | 0.097 | U | 0.097 | 0.49 |
| 4,4'-DDD | 0.0063 | U | 0.0063 | 0.097 |
| 4,4'-DDE | 0.0075 | U | 0.0075 | 0.097 |
| 4,4'-DDT | 0.0094 | U | 0.0094 | 0.097 |
| delta-BHC | 0.0047 | U | 0.0047 | 0.049 |
| Dieldrin | 0.0088 | U | 0.0088 | 0.097 |
| Endosulfan I | 0.0041 | U | 0.0041 | 0.049 |
| Endosulfan II | 0.0095 | U | 0.0095 | 0.097 |
| Endosulfan sulfate | 0.0066 | U | 0.0066 | 0.097 |
| Endrin | 0.0094 | U | 0.0094 | 0.097 |
| Endrin aldehyde | 0.016 | U | 0.016 | 0.097 |
| Endrin ketone | 0.0082 | U | 0.0082 | 0.097 |
| gamma-BHC (Lindane) | 0.0057 | U | 0.0057 | 0.049 |
| Heptachlor | 0.0068 | U | 0.0068 | 0.049 |
| Heptachlor epoxide | 0.0058 | U | 0.0058 | 0.049 |
| Methoxychlor | 0.013 | U | 0.013 | 0.097 |
| PCB-1016 | 0.069 | U | 0.069 | 0.97 |
| PCB-1221 | 0.27 | U | 0.27 | 1.9 |
| PCB-1232 | 0.11 | U | 0.11 | 0.97 |
| PCB-1242 | 0.17 | U | 0.17 | 0.97 |
| PCB-1248 | 0.35 | U | 0.35 | 0.97 |
| PCB-1254 | 0.25 | U | 0.25 | 0.97 |
| PCB-1260 | 0.19 | U | 0.19 | 0.97 |
| Toxaphene | 0.49 | U | 0.49 | 4.9 |
| Surrogate | | | | |
| DCB Decachlorobiphenyl | %Rec | Qualifier | Acceptance Limits | |
| Tetrachloro-m-xylene | 48 | | 14 - 115 | |
| | 56 | J | 35 - 120 | |

Analytical Data

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1Client Sample ID: **OU1-16GW48**

Lab Sample ID: 680-57992-1

Date Sampled: 05/25/2010 1425

Client Matrix: Water

Date Received: 05/26/2010 0905

8081A_8082 Organochlorine Pesticides & PCBs (GC)

| | | | | | |
|----------------|-----------------|-----------------|------------|------------------------|-----------|
| Method: | 8081A_8082 | Analysis Batch: | 680-170183 | Instrument ID: | SGM |
| Preparation: | 3520C | Prep Batch: | 680-169889 | Initial Weight/Volume: | 1030 mL |
| Dilution: | 1.0 | | | Final Weight/Volume: | 10 mL |
| Date Analyzed: | 05/28/2010 2347 | | | Injection Volume: | 2 uL |
| Date Prepared: | 05/27/2010 1448 | | | Result Type: | SECONDARY |

| Surrogate | %Rec | Qualifier | Acceptance Limits |
|------------------------|------|-----------|-------------------|
| DCB Decachlorobiphenyl | 40 | | 14 - 115 |
| Tetrachloro-m-xylene | 121 | J | 35 - 120 |

Analytical Data

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1Client Sample ID: **OU1-16GW48**Lab Sample ID: 680-57992-1
Client Matrix: WaterDate Sampled: 05/25/2010 1425
Date Received: 05/26/2010 0905**8310 PAHs (HPLC)**

| | | | | |
|----------------|-----------------|----------------------------|------------------------|---------|
| Method: | 8310 | Analysis Batch: 400-110243 | Instrument ID: | WIGGLE |
| Preparation: | 3520C | Prep Batch: 400-109891 | Initial Weight/Volume: | 1020 mL |
| Dilution: | 1.0 | | Final Weight/Volume: | 1.0 mL |
| Date Analyzed: | 06/04/2010 1708 | | Injection Volume: | |
| Date Prepared: | 06/01/2010 0939 | | Result Type: | PRIMARY |

| Analyte | Result (ug/L) | Qualifier | MDL | RL |
|------------------------|---------------|-----------|-------------------|------|
| Acenaphthene | 0.14 | U | 0.14 | 0.98 |
| Acenaphthylene | 0.17 | U | 0.17 | 0.98 |
| Anthracene | 0.15 | U | 0.15 | 0.98 |
| Benzo[a]anthracene | 0.098 | U | 0.098 | 0.20 |
| Benzo[a]pyrene | 0.098 | U | 0.098 | 0.20 |
| Benzo[b]fluoranthene | 0.098 | U | 0.098 | 0.20 |
| Benzo[g,h,i]perylene | 0.14 | U | 0.14 | 0.98 |
| Benzo[k]fluoranthene | 0.098 | U | 0.098 | 0.49 |
| Chrysene | 0.098 | U | 0.098 | 0.98 |
| Dibenz(a,h)anthracene | 0.18 | U | 0.18 | 0.20 |
| Fluoranthene | 0.14 | U | 0.14 | 0.98 |
| Fluorene | 0.15 | U | 0.15 | 0.98 |
| Indeno[1,2,3-cd]pyrene | 0.11 | U | 0.11 | 0.20 |
| 1-Methylnaphthalene | 0.12 | U | 0.12 | 0.98 |
| 2-Methylnaphthalene | 0.11 | U | 0.11 | 0.98 |
| Naphthalene | 0.12 | U | 0.12 | 0.98 |
| Phenanthrene | 0.14 | U | 0.14 | 0.98 |
| Pyrene | 0.17 | U | 0.17 | 0.98 |
| Surrogate | %Rec | Qualifier | Acceptance Limits | |
| 2-Chloroanthracene | 101 | | 37 - 141 | |

DATA REPORTING QUALIFIERS

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1

Sdg Number: CHP57992-1

| Lab Section | Qualifier | Description |
|-------------|-----------|---|
| GC/MS VOA | J | Estimated: The analyte was positively identified; the quantitation is an estimation |
| | U | Undetected at the Limit of Detection. |
| GC Semi VOA | J | Estimated: The analyte was positively identified; the quantitation is an estimation |
| | J | Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria. |
| | M | Manual integrated compound. |
| | U | Undetected at the Limit of Detection. |
| HPLC/IC | U | Undetected at the Limit of Detection. |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Method Blank - Batch: 680-170708

Method: 8260B

Preparation: 5030B

Lab Sample ID: MB 680-170708/21
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 06/05/2010 1301
Date Prepared: 06/05/2010 1301

Analysis Batch: 680-170708
Prep Batch: N/A
Units: ug/L

Instrument ID: MSP
Lab File ID: pq081.d
Initial Weight/Volume: 5 mL
Final Weight/Volume: 5 mL

| Analyte | Result | Qual | MDL | RL |
|-----------------------------|--------|------|-------------------|------|
| Acetone | 5.0 | U | 5.0 | 25 |
| Benzene | 0.25 | U | 0.25 | 1.0 |
| Bromoform | 0.50 | U | 0.50 | 1.0 |
| Bromomethane | 0.80 | U | 0.80 | 1.0 |
| 2-Butanone (MEK) | 1.0 | U | 1.0 | 10 |
| Carbon disulfide | 0.60 | U | 0.60 | 2.0 |
| Carbon tetrachloride | 0.50 | U | 0.50 | 1.0 |
| Chlorobenzene | 0.25 | U | 0.25 | 1.0 |
| Chlorodibromomethane | 0.10 | U | 0.10 | 1.0 |
| Chloroethane | 1.0 | U | 1.0 | 1.0 |
| Chloroform | 0.14 | U | 0.14 | 1.0 |
| Chloromethane | 0.33 | U | 0.33 | 1.0 |
| cis-1,2-Dichloroethene | 0.15 | U | 0.15 | 1.0 |
| cis-1,3-Dichloropropene | 0.11 | U | 0.11 | 1.0 |
| Dichlorobromomethane | 0.25 | U | 0.25 | 1.0 |
| 1,1-Dichloroethane | 0.25 | U | 0.25 | 1.0 |
| 1,2-Dichloroethane | 0.10 | U | 0.10 | 1.0 |
| 1,1-Dichloroethene | 0.11 | U | 0.11 | 1.0 |
| 1,2-Dichloropropane | 0.13 | U | 0.13 | 1.0 |
| Ethylbenzene | 0.11 | U | 0.11 | 1.0 |
| 2-Hexanone | 1.0 | U | 1.0 | 10 |
| Methylene Chloride | 1.0 | U | 1.0 | 5.0 |
| 4-Methyl-2-pentanone (MIBK) | 1.0 | U | 1.0 | 10 |
| Styrene | 0.11 | U | 0.11 | 1.0 |
| 1,1,2,2-Tetrachloroethane | 0.18 | U | 0.18 | 1.0 |
| Tetrachloroethene | 0.15 | U | 0.15 | 1.0 |
| Toluene | 0.33 | U | 0.33 | 1.0 |
| trans-1,2-Dichloroethene | 0.20 | U | 0.20 | 1.0 |
| trans-1,3-Dichloropropene | 0.21 | U | 0.21 | 1.0 |
| 1,1,1-Trichloroethane | 0.50 | U | 0.50 | 1.0 |
| 1,1,2-Trichloroethane | 0.13 | U | 0.13 | 1.0 |
| Trichloroethene | 0.13 | U | 0.13 | 1.0 |
| Vinyl chloride | 0.18 | U | 0.18 | 0.50 |
| Xylenes, Total | 0.20 | U | 0.20 | 2.0 |
| Surrogate | % Rec | | Acceptance Limits | |
| 4-Bromofluorobenzene | 83 | | 75 - 120 | |
| Dibromofluoromethane | 102 | | 75 - 121 | |
| Toluene-d8 (Surr) | 101 | | 75 - 120 | |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 680-170708

Method: 8260B

Preparation: 5030B

| | | | | | |
|---------------------|--------------------|-----------------|------------|------------------------|---------|
| LCS Lab Sample ID: | LCS 680-170708/18 | Analysis Batch: | 680-170708 | Instrument ID: | MSP |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | pq073.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 5 mL |
| Date Analyzed: | 06/05/2010 1057 | | | Final Weight/Volume: | 5 mL |
| Date Prepared: | 06/05/2010 1057 | | | | |
| LCSD Lab Sample ID: | LCSD 680-170708/19 | Analysis Batch: | 680-170708 | Instrument ID: | MSP |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | pq075.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 5 mL |
| Date Analyzed: | 06/05/2010 1127 | | | Final Weight/Volume: | 5 mL |
| Date Prepared: | 06/05/2010 1127 | | | | |

| Analyte | | LCS | LCSD | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual | % Rec. |
|-----------------------------|--|-----|------|----------|-----|-----------|----------|-----------|--------|
| Acetone | | 84 | 66 | 17 - 175 | 24 | 50 | | | |
| Benzene | | 102 | 104 | 77 - 119 | 2 | 30 | | | |
| Bromoform | | 110 | 100 | 62 - 133 | 10 | 30 | | | |
| Bromomethane | | 132 | 107 | 12 - 184 | 21 | 50 | | | |
| 2-Butanone (MEK) | | 94 | 101 | 33 - 157 | 7 | 30 | | | |
| Carbon disulfide | | 117 | 99 | 55 - 131 | 16 | 30 | | | |
| Carbon tetrachloride | | 106 | 99 | 71 - 135 | 7 | 30 | | | |
| Chlorobenzene | | 105 | 104 | 85 - 116 | 1 | 30 | | | |
| Chlorodibromomethane | | 102 | 100 | 75 - 133 | 1 | 30 | | | |
| Chloroethane | | 96 | 85 | 40 - 165 | 12 | 50 | | | |
| Chloroform | | 112 | 120 | 82 - 120 | 7 | 30 | | | |
| Chloromethane | | 118 | 114 | 48 - 142 | 3 | 50 | | | |
| cis-1,2-Dichloroethene | | 96 | 93 | 69 - 134 | 3 | 30 | | | |
| cis-1,3-Dichloropropene | | 108 | 110 | 76 - 126 | 2 | 30 | | | |
| Dichlorobromomethane | | 108 | 103 | 78 - 127 | 5 | 30 | | | |
| 1,1-Dichloroethane | | 102 | 86 | 74 - 127 | 17 | 30 | | | |
| 1,2-Dichloroethane | | 103 | 95 | 66 - 132 | 9 | 30 | | | |
| 1,1-Dichloroethene | | 98 | 81 | 62 - 141 | 19 | 30 | | | |
| 1,2-Dichloropropane | | 100 | 106 | 73 - 124 | 5 | 30 | | | |
| Ethylbenzene | | 106 | 102 | 86 - 116 | 4 | 30 | | | |
| 2-Hexanone | | 102 | 101 | 34 - 161 | 1 | 30 | | | |
| Methylene Chloride | | 101 | 88 | 70 - 125 | 13 | 30 | | | |
| 4-Methyl-2-pentanone (MIBK) | | 99 | 101 | 40 - 151 | 1 | 30 | | | |
| Styrene | | 107 | 102 | 82 - 122 | 5 | 30 | | | |
| 1,1,2,2-Tetrachloroethane | | 91 | 76 | 69 - 129 | 18 | 30 | | | |
| Tetrachloroethene | | 98 | 101 | 76 - 126 | 3 | 30 | | | |
| Toluene | | 101 | 101 | 81 - 117 | 1 | 30 | | | |
| trans-1,2-Dichloroethene | | 95 | 86 | 72 - 131 | 10 | 30 | | | |
| trans-1,3-Dichloropropene | | 105 | 102 | 73 - 128 | 2 | 30 | | | |
| 1,1,1-Trichloroethane | | 103 | 98 | 76 - 127 | 5 | 30 | | | |
| 1,1,2-Trichloroethane | | 103 | 99 | 75 - 121 | 4 | 30 | | | |
| Trichloroethene | | 106 | 106 | 84 - 115 | 1 | 30 | | | |
| Vinyl chloride | | 132 | 117 | 59 - 144 | 12 | 50 | | | |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 680-170708

Method: 8260B

Preparation: 5030B

| | | | | | |
|--------------------|-------------------|-----------------|------------|------------------------|---------|
| LCS Lab Sample ID: | LCS 680-170708/18 | Analysis Batch: | 680-170708 | Instrument ID: | MSP |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | pq073.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 5 mL |
| Date Analyzed: | 06/05/2010 1057 | | | Final Weight/Volume: | 5 mL |
| Date Prepared: | 06/05/2010 1057 | | | | |

| | | | | | |
|---------------------|--------------------|-----------------|------------|------------------------|---------|
| LCSD Lab Sample ID: | LCSD 680-170708/19 | Analysis Batch: | 680-170708 | Instrument ID: | MSP |
| Client Matrix: | Water | Prep Batch: | N/A | Lab File ID: | pq075.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 5 mL |
| Date Analyzed: | 06/05/2010 1127 | | | Final Weight/Volume: | 5 mL |
| Date Prepared: | 06/05/2010 1127 | | | | |

| Analyte | % Rec. | | RPD | RPD Limit | LCS Qual | LCSD Qual |
|----------------------|--------|-----------|------------|-----------|-------------------|-----------|
| | LCS | LCSD | | | | |
| Xylenes, Total | 104 | 102 | 84 - 118 | 1 | 30 | |
| Surrogate | | LCS % Rec | LCSD % Rec | | Acceptance Limits | |
| 4-Bromofluorobenzene | 100 | | 85 | | 75 - 120 | |
| Dibromofluoromethane | 104 | | 109 | | 75 - 121 | |
| Toluene-d8 (Surr) | 105 | | 103 | | 75 - 120 | |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Method Blank - Batch: 680-169889

Method: 8081A_8082

Preparation: 3520C

Lab Sample ID: MB 680-169889/5-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 05/28/2010 1837
Date Prepared: 05/27/2010 1448

Analysis Batch: 680-170183
Prep Batch: 680-169889
Units: ug/L

Instrument ID: SGM
Lab File ID: me28015.d
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 10 mL
Injection Volume: 2 uL
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | RL |
|-----------------------|--------|------|--------|-------|
| Aldrin | 0.0070 | U | 0.0070 | 0.050 |
| alpha-BHC | 0.0057 | U | 0.0057 | 0.050 |
| beta-BHC | 0.0067 | U | 0.0067 | 0.050 |
| Chlordane (technical) | 0.10 | U | 0.10 | 0.50 |
| 4,4'-DDD | 0.0065 | U | 0.0065 | 0.10 |
| 4,4'-DDE | 0.0077 | U | 0.0077 | 0.10 |
| 4,4'-DDT | 0.0097 | U | 0.0097 | 0.10 |
| delta-BHC | 0.0048 | U | 0.0048 | 0.050 |
| Dieldrin | 0.0091 | U | 0.0091 | 0.10 |
| Endosulfan I | 0.0042 | U | 0.0042 | 0.050 |
| Endosulfan II | 0.0098 | U | 0.0098 | 0.10 |
| Endosulfan sulfate | 0.0068 | U | 0.0068 | 0.10 |
| Endrin | 0.0097 | U | 0.0097 | 0.10 |
| Endrin aldehyde | 0.016 | U | 0.016 | 0.10 |
| Endrin ketone | 0.0084 | U | 0.0084 | 0.10 |
| gamma-BHC (Lindane) | 0.0059 | U | 0.0059 | 0.050 |
| Heptachlor | 0.0070 | U | 0.0070 | 0.050 |
| Heptachlor epoxide | 0.0060 | U | 0.0060 | 0.050 |
| Methoxychlor | 0.013 | U | 0.013 | 0.10 |
| PCB-1016 | 0.071 | U | 0.071 | 1.0 |
| PCB-1221 | 0.28 | U | 0.28 | 2.0 |
| PCB-1232 | 0.11 | U | 0.11 | 1.0 |
| PCB-1242 | 0.18 | U | 0.18 | 1.0 |
| PCB-1248 | 0.36 | U | 0.36 | 1.0 |
| PCB-1254 | 0.26 | U | 0.26 | 1.0 |
| PCB-1260 | 0.20 | U | 0.20 | 1.0 |
| Toxaphene | 0.50 | U | 0.50 | 5.0 |

| Surrogate | % Rec | Acceptance Limits |
|------------------------|-------|-------------------|
| DCB Decachlorobiphenyl | 82 | 14 - 115 |
| Tetrachloro-m-xylene | 68 | 35 - 120 |

| Surrogate | % Rec | Acceptance Limits |
|------------------------|-------|-------------------|
| DCB Decachlorobiphenyl | 76 | 14 - 115 |
| Tetrachloro-m-xylene | 68 | 35 - 120 |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 680-169889

Method: 8081A_8082

Preparation: 3520C

| | | | | | |
|--------------------|--------------------|-----------------|------------|------------------------|-----------|
| LCS Lab Sample ID: | LCS 680-169889/6-A | Analysis Batch: | 680-170183 | Instrument ID: | SGM |
| Client Matrix: | Water | Prep Batch: | 680-169889 | Lab File ID: | me28016.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 05/28/2010 1857 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 05/27/2010 1448 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---------------------|---------------------|-----------------|------------|------------------------|-----------|
| LCSD Lab Sample ID: | LCSD 680-169889/7-A | Analysis Batch: | 680-170183 | Instrument ID: | SGM |
| Client Matrix: | Water | Prep Batch: | 680-169889 | Lab File ID: | me28017.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 05/28/2010 1916 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 05/27/2010 1448 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | % Rec. | | RPD | RPD Limit | LCS Qual | LCSD Qual |
|---------------------|--------|------|----------|-----------|----------|-----------|
| | LCS | LCSD | | | | |
| Aldrin | 59 | 62 | 32 - 114 | 5 | 40 | |
| alpha-BHC | 50 | 64 | 29 - 112 | 25 | 40 | J |
| beta-BHC | 66 | 73 | 15 - 204 | 10 | 40 | J |
| 4,4'-DDD | 78 | 85 | 37 - 179 | 8 | 40 | |
| 4,4'-DDE | 61 | 68 | 33 - 142 | 11 | 40 | |
| 4,4'-DDT | 86 | 97 | 27 - 141 | 12 | 40 | |
| delta-BHC | 84 | 83 | 25 - 123 | 0 | 40 | |
| Dieldrin | 80 | 85 | 45 - 137 | 7 | 40 | |
| Endosulfan I | 76 | 82 | 31 - 134 | 7 | 40 | |
| Endosulfan II | 69 | 73 | 24 - 144 | 5 | 40 | |
| Endosulfan sulfate | 74 | 79 | 44 - 128 | 7 | 40 | |
| Endrin | 73 | 78 | 38 - 144 | 7 | 40 | |
| Endrin aldehyde | 104 | 107 | 37 - 135 | 3 | 40 | J |
| Endrin ketone | 86 | 90 | 41 - 155 | 4 | 40 | |
| gamma-BHC (Lindane) | 71 | 77 | 31 - 118 | 7 | 40 | |
| Heptachlor | 75 | 77 | 30 - 133 | 3 | 40 | |
| Heptachlor epoxide | 80 | 90 | 34 - 126 | 12 | 40 | M |
| Methoxychlor | 55 | 59 | 10 - 243 | 8 | 40 | J |

| Surrogate | LCS % Rec | LCSD % Rec | Acceptance Limits | |
|------------------------|-----------|------------|-------------------|--|
| DCB Decachlorobiphenyl | 55 | 64 | 14 - 115 | |
| Tetrachloro-m-xylene | 43 | J | 35 - 120 | |

| Surrogate | LCS % Rec | LCSD % Rec | Acceptance Limits | |
|------------------------|-----------|------------|-------------------|--|
| DCB Decachlorobiphenyl | 44 | 57 | 14 - 115 | |
| Tetrachloro-m-xylene | 65 | J | 35 - 120 | |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 680-169889

Method: 8081A_8082

Preparation: 3520C

| | | | | | |
|--------------------|---------------------|-----------------|------------|------------------------|-----------|
| LCS Lab Sample ID: | LCS 680-169889/10-A | Analysis Batch: | 680-170183 | Instrument ID: | SGM |
| Client Matrix: | Water | Prep Batch: | 680-169889 | Lab File ID: | me28018.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 05/28/2010 1935 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 05/27/2010 1448 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---------------------|----------------------|-----------------|------------|------------------------|-----------|
| LCSD Lab Sample ID: | LCSD 680-169889/11-A | Analysis Batch: | 680-170183 | Instrument ID: | SGM |
| Client Matrix: | Water | Prep Batch: | 680-169889 | Lab File ID: | me28019.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 05/28/2010 1955 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 05/27/2010 1448 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | % Rec. | | RPD | RPD Limit | LCS Qual | LCSD Qual |
|------------------------|-----------|------|------------|-----------|-------------------|-----------|
| | LCS | LCSD | | | | |
| PCB-1016 | 86 | 80 | 57 - 124 | 8 | 40 | |
| PCB-1260 | 85 | 65 | 58 - 124 | 26 | 40 | |
| Surrogate | LCS % Rec | | LCSD % Rec | | Acceptance Limits | |
| DCB Decachlorobiphenyl | | | 43 | 44 | 14 - 115 | |
| Tetrachloro-m-xylene | | | 62 | 52 | 35 - 120 | |
| Surrogate | LCS % Rec | | LCSD % Rec | | Acceptance Limits | |
| DCB Decachlorobiphenyl | | | 39 | 42 | 14 - 115 | |
| Tetrachloro-m-xylene | | | 57 | 45 | 35 - 120 | |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Lab Control Sample/

Lab Control Sample Duplicate Recovery Report - Batch: 680-169889

Method: 8081A_8082

Preparation: 3520C

| | | | | | |
|--------------------|---------------------|-----------------|------------|------------------------|-----------|
| LCS Lab Sample ID: | LCS 680-169889/12-A | Analysis Batch: | 680-170183 | Instrument ID: | SGM |
| Client Matrix: | Water | Prep Batch: | 680-169889 | Lab File ID: | me28020.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 05/28/2010 2014 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 05/27/2010 1448 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| | | | | | |
|---------------------|----------------------|-----------------|------------|------------------------|-----------|
| LCSD Lab Sample ID: | LCSD 680-169889/13-A | Analysis Batch: | 680-170183 | Instrument ID: | SGM |
| Client Matrix: | Water | Prep Batch: | 680-169889 | Lab File ID: | me28021.d |
| Dilution: | 1.0 | Units: | ug/L | Initial Weight/Volume: | 1000 mL |
| Date Analyzed: | 05/28/2010 2033 | | | Final Weight/Volume: | 10 mL |
| Date Prepared: | 05/27/2010 1448 | | | Injection Volume: | 2 uL |
| | | | | Column ID: | PRIMARY |

| Analyte | % Rec. | | Limit | RPD | RPD Limit | LCS Qual | LCSD Qual |
|------------------------|--------|-----------|------------|-----|-------------------|----------|-----------|
| | LCS | LCSD | | | | | |
| Toxaphene | 97 | 92 | 30 - 120 | 5 | 40 | | |
| Surrogate | | LCS % Rec | LCSD % Rec | | Acceptance Limits | | |
| DCB Decachlorobiphenyl | 75 | | 45 | | | 14 - 115 | |
| Tetrachloro-m-xylene | 73 | | 70 | | | 35 - 120 | |
| Surrogate | | LCS % Rec | LCSD % Rec | | Acceptance Limits | | |
| DCB Decachlorobiphenyl | 65 | | 39 | | | 14 - 115 | |
| Tetrachloro-m-xylene | 71 | | 67 | | | 35 - 120 | |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Method Blank - Batch: 400-109891

Method: 8310

Preparation: 3520C

Lab Sample ID: MB 400-109891/4-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 06/04/2010 1527
Date Prepared: 06/01/2010 0939

Analysis Batch: 400-110243
Prep Batch: 400-109891
Units: ug/L

Instrument ID: WIGGLE
Lab File ID: 003-0301.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 1.0 mL
Injection Volume:
Column ID: PRIMARY

| Analyte | Result | Qual | MDL | RL |
|------------------------|--------|-------------------|------|------|
| Acenaphthene | 0.14 | U | 0.14 | 1.0 |
| Acenaphthylene | 0.17 | U | 0.17 | 1.0 |
| Anthracene | 0.15 | U | 0.15 | 1.0 |
| Benzo[a]anthracene | 0.10 | U | 0.10 | 0.20 |
| Benzo[a]pyrene | 0.10 | U | 0.10 | 0.20 |
| Benzo[b]fluoranthene | 0.10 | U | 0.10 | 0.20 |
| Benzo[g,h,i]perylene | 0.14 | U | 0.14 | 1.0 |
| Benzo[k]fluoranthene | 0.10 | U | 0.10 | 0.50 |
| Chrysene | 0.10 | U | 0.10 | 1.0 |
| Dibenz(a,h)anthracene | 0.18 | U | 0.18 | 0.20 |
| Fluoranthene | 0.14 | U | 0.14 | 1.0 |
| Fluorene | 0.15 | U | 0.15 | 1.0 |
| Indeno[1,2,3-cd]pyrene | 0.11 | U | 0.11 | 0.20 |
| 1-Methylnaphthalene | 0.12 | U | 0.12 | 1.0 |
| 2-Methylnaphthalene | 0.11 | U | 0.11 | 1.0 |
| Naphthalene | 0.12 | U | 0.12 | 1.0 |
| Phenanthrene | 0.14 | U | 0.14 | 1.0 |
| Pyrene | 0.17 | U | 0.17 | 1.0 |
| Surrogate | % Rec | Acceptance Limits | | |
| 2-Chloroanthracene | 125 | 37 - 141 | | |

Quality Control Results

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1
Sdg Number: CHP57992-1

Lab Control Sample - Batch: 400-109891

Method: 8310

Preparation: 3520C

Lab Sample ID: LCS 400-109891/3-A
Client Matrix: Water
Dilution: 1.0
Date Analyzed: 06/04/2010 1600
Date Prepared: 06/01/2010 0939

Analysis Batch: 400-110243
Prep Batch: 400-109891
Units: ug/L

Instrument ID: WIGGLE
Lab File ID: 004-0401.D
Initial Weight/Volume: 1000 mL
Final Weight/Volume: 1.0 mL
Injection Volume:
Column ID: PRIMARY

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|------------------------|--------------|--------|--------|-------------------|------|
| Acenaphthene | 10.0 | 8.67 | 87 | 45 - 114 | |
| Acenaphthylene | 10.0 | 7.23 | 72 | 49 - 99 | |
| Anthracene | 10.0 | 7.54 | 75 | 59 - 114 | |
| Benzo[a]anthracene | 10.0 | 8.73 | 87 | 58 - 110 | |
| Benzo[a]pyrene | 10.0 | 7.15 | 71 | 41 - 100 | |
| Benzo[b]fluoranthene | 10.0 | 7.59 | 76 | 44 - 102 | |
| Benzo[g,h,i]perylene | 10.0 | 5.14 | 51 | 14 - 96 | |
| Benzo[k]fluoranthene | 10.0 | 6.95 | 70 | 35 - 102 | |
| Chrysene | 10.0 | 10.0 | 100 | 58 - 121 | |
| Dibenz(a,h)anthracene | 10.0 | 4.97 | 50 | 13 - 102 | |
| Fluoranthene | 10.0 | 8.59 | 86 | 56 - 135 | |
| Fluorene | 10.0 | 7.78 | 78 | 50 - 101 | |
| Indeno[1,2,3-cd]pyrene | 10.0 | 5.76 | 58 | 33 - 103 | |
| 1-Methylnaphthalene | 10.0 | 7.82 | 78 | 34 - 110 | |
| 2-Methylnaphthalene | 10.0 | 7.78 | 78 | 30 - 112 | |
| Naphthalene | 10.0 | 13.7 | 137 | 15 - 137 | |
| Phenanthrene | 10.0 | 8.29 | 83 | 57 - 116 | |
| Pyrene | 10.0 | 9.01 | 90 | 62 - 117 | |
| Surrogate | | % Rec | | Acceptance Limits | |
| 2-Chloroanthracene | | 96 | | 37 - 141 | |

| ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD | | | | | | TestAmerica Savannah 5102 LaRoche Avenue Savannah, GA 31404 | | Website: www.testamericainc.com Phone: (912) 354-7858 Fax: (912) 352-0165 | | | | |
|--|--------------------------------------|---------------------------------------|----------------------|--|------------------|---|---------------------------------------|---|------------------------------|---------|------|------|
| TestAmerica <hr/> <small>THE LEADER IN ENVIRONMENTAL TESTING</small> | | | | | | Alternate Laboratory Name/Location | | Phone: Fax: | | | | |
| PROJECT REFERENCE <i>OUI-Site 16 Cherry Point</i> | PROJECT NO. <i>438</i> | PROJECT LOCATION (STATE) <i>NC</i> | MATRIX TYPE | REQUIRED ANALYSIS | | | | PAGE | OF | | | |
| TAL (LAB) PROJECT MANAGER <i>Kathy Smith</i> | P.O. NUMBER | CONTRACT NO. | | | | | | STANDARD REPORT DELIVERY | | | | |
| CLIENT (SITE) PM <i>Brad McCalla</i> | CLIENT PHONE <i>724-443-4111</i> | CLIENT FAX | | | | | | DATE DUE _____ | | | | |
| CLIENT NAME <i>Rhea Engineers + Consultants</i> | CLIENT E-MAIL <i>Brad@rhea.us</i> | | | | | | | EXPEDITED REPORT DELIVERY (SURCHARGE) | | | | |
| CLIENT ADDRESS <i>4975 William Flynn Hwy, Suite 14, Gibsonia, PA 15044</i> | | | | | | | | DATE DUE _____ | | | | |
| COMPONENTS OF SAMPLE | | | | | | NUMBER OF COOLERS SUBMITTED PER SHIPMENT: | | | | | | |
| SAMPLE | SAMPLE IDENTIFICATION | | | | | NUMBER OF CONTAINERS SUBMITTED | | | | REMARKS | | |
| DATE <i>5/25/10</i> | TIME <i>14:05</i> | OUI-16GW48 | | | | | G X | 3 | 2 | 2 | | |
| TZ <i>21</i> | | <i>Trip Blank</i> | | | | | G X | 3 | | | | |
| O | | | | | | | | | | | | |
| F <i>23</i> | | | | | | | | | | | | |
| RELINQUISHED BY: (SIGNATURE) <i>CC L'ville</i> | | DATE <i>5/25/10</i> | TIME <i>5:45</i> | RELINQUISHED BY: (SIGNATURE) | | | DATE | TIME | RELINQUISHED BY: (SIGNATURE) | | DATE | TIME |
| RECEIVED BY: (SIGNATURE) | | DATE | TIME | RECEIVED BY: (SIGNATURE) | | | DATE | TIME | RECEIVED BY: (SIGNATURE) | | DATE | TIME |
| LABORATORY USE ONLY | | | | | | | | | | | | |
| RECEIVED FOR LABORATORY BY: (SIGNATURE) <i>Beth A. Daughtry</i> | | DATE <i>5/26/10</i> | TIME <i>09:05</i> | CUSTODY INTACT YES <input type="radio"/> NO <input checked="" type="radio"/> | CUSTODY SEAL NO. | SAVANNAH LOG NO. <i>680-57992</i> | LABORATORY REMARKS <i>Temp 5.4</i> | | | | | |

Login Sample Receipt Check List

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1

SDG Number: CHP57992-1

Login Number: 57992

List Source: TestAmerica Savannah

Creator: Daughtry, Beth

List Number: 1

| Question | T / F / NA | Comment |
|--|------------|---------|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Is the Field Sampler's name present on COC? | False | |
| Sample Preservation Verified | True | |

Login Sample Receipt Check List

Client: Rhea Engineers & Consultants, Inc.

Job Number: 680-57992-1

SDG Number: CHP57992-1

Login Number: 57992

List Source: TestAmerica Pensacola

Creator: Hor, Koma

List Creation: 05/27/10 05:50 PM

List Number: 1

| Question | T / F / NA | Comment |
|--|------------|---------|
| Radioactivity either was not measured or, if measured, is at or below background | N/A | |
| The cooler's custody seal, if present, is intact. | True | |
| The cooler or samples do not appear to have been compromised or tampered with. | True | |
| Samples were received on ice. | True | |
| Cooler Temperature is acceptable. | True | |
| Cooler Temperature is recorded. | True | 0.0°C |
| COC is present. | True | |
| COC is filled out in ink and legible. | True | |
| COC is filled out with all pertinent information. | True | |
| There are no discrepancies between the sample IDs on the containers and the COC. | True | |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | True | |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs | True | |
| VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter. | True | |
| If necessary, staff have been informed of any short hold time or quick TAT needs | True | |
| Multiphasic samples are not present. | True | |
| Samples do not require splitting or compositing. | True | |
| Is the Field Sampler's name present on COC? | True | |
| Sample Preservation Verified | True | |



WELL INSTALLATION DIAGRAM

WELL IDENTIFICATION: 16GW48

PROJECT: OU1, Site 16 – MCAS Cherry Point, NC | DATE: 05/17/2010

DRILLER: Parratt-Wolff, Inc.

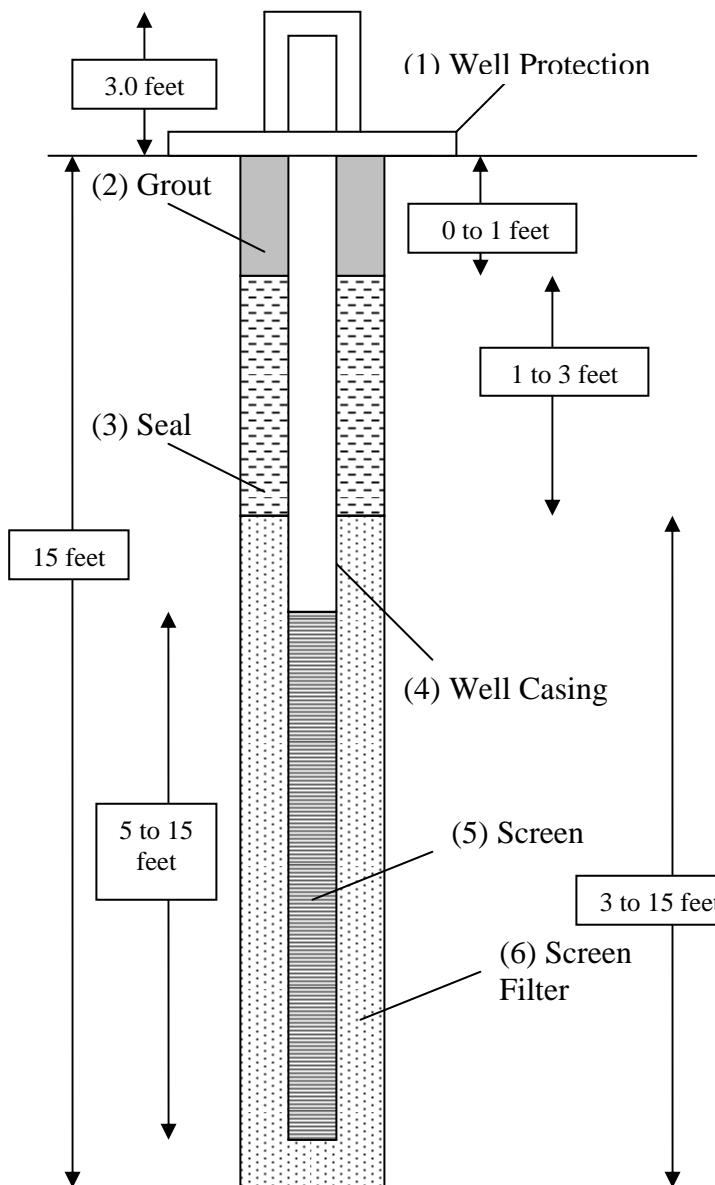
DRILLING METHOD: Direct Push Technology

NORTHING COORDINATE: 421084.87

EASTING COORDINATE: 2627442.89

RHÉA REPRESENTATIVE: Ken Robitaille

DEPTH TO WATER: 4.36 feet



Top of Casing Elevation: 5.44 feet amsl

Ground Elevation: 2.46 feet amsl

(1) Well Protection

| | |
|--------------|--------------------|
| Bollards | 4 Bollards |
| Concrete Pad | 2' Round, 4" thick |

(2) Grout

| | |
|-----------|----------|
| Type | Portland |
| Placement | In-place |

(3) Type of Seal Bentonite

(4) Well Casing

| | |
|----------|-------------|
| Material | Sch. 40 PVC |
| Diameter | 2 inch |

(5) Screen

| | |
|-----------|-------------|
| Type | Sch. 40 PVC |
| Slot Size | .010 |

(6) Screen Filter

| | |
|----------|------------------|
| Type | #1 Coarse Sand |
| Quantity | 3.0 to 15.0 feet |

Development Method: Whale Pump

Estimated Purge Volume: 20 gallons

Comments: NA